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ATLAS OF FISHES OF THE UPPER RED RIVER SYSTEM IN TEXAS AND OKLAHOMA

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Abstract: This atlas presents a report on fishes collected from the upper Red River system between 27 June 1952 and 19 May 1989. A total of 84 samples taken at 58 sites from the major tributaries and from the main stem of the Red River down to the head of Lake Texoma resulted in the collection of 98,210 specimens representing 45 species plus one hybrid combination. Locality data are given for each collection site, with number of species and specimens taken at each site, followed by a total list of species taken at each site. A distribution map is presented for each species. The legend for each map includes family name, scientific and common name of the species, number of collection sites, and total specimens collected.

INTRODUCTION

The first scientific collections from the upper Red River area were those made by Randolph B. Marcy, Captain Fifth Infantry U.S. Army assisted by George B. McClellan, Brevet Captain U.S. Engineers in the year 1852 (Marcy and McClellan 1854). A single collection of fishes was obtained from Otter Creek [tributary to North Fork Red River], Arkansas. Otter Creek is located in western Oklahoma, however, Oklahoma did not gain statehood until 1907 and thus the collection area was considered as in Arkansas in 1852.

The reptiles, fishes, orthopterous insects, arachnidians, and myriapods were sent to the Smithsonian Institution where Baird and Girard published upon the reptiles and fishes. Baird and Girard (1853) described five species of fishes in the Marcy and McClellan collection:

Pomotis breviceps = subspecies of *Lepomis megalotis* (Rafinesque 1820)

Pomotis longulus = *Lepomis cyanellus* Rafinesque 1819

Leuciscus lutrensis = *Cyprinella lutrensis* (Baird and Girard 1853)

Leuciscus bubalinus = *Cyprinella lutrensis* (Baird and Girard 1853)

Ceratichthys vigilax = *Pimephales vigilax* (Baird and Girard 1853)

There were no appended illustrations in the Baird and Girard (1853) paper. Apparently, recent authors

have missed the detailed descriptions of these same fishes in Marcy and McClellan (1854, Appendix F, pp. 216-223). Marcy and McClellan stated that each species was represented by a single specimen except for *Leuciscus lutrensis* of which there were several specimens and that the *Ceratichthys vigilax* specimen was immature. Also of more importance, they included excellent illustrations of the five species and of three scales from each in Zoology Plates XII, XIII, and XIV.

This atlas has two primary purposes – first, to document the distributions of fishes collected from the upper Red River system and second, to serve as a database for comparison to future aquatic survey samples. There is a diminishing water supply in western Texas and along with the present and proposed desalination projects it is reasonable to expect changes in populations of fishes and other aquatic organisms.

STUDY AREA

Our study area of the upper Red River system includes the area west of a north-south line between Ardmore, Oklahoma and Gainesville, Texas or essentially west of Interstate Highway 35. This area in Texas and Oklahoma is referred to as the Osage Plains and extends westward to the eastern edge of the High Plains Province (Fenneman 1931). Wynd (1944) shows the physiographic divisions of Texas in Figure 19 (taken from Trowbridge 1932) and distribution of vegetation for the same section of Texas in Figure 1, following Tharp (1939). The Osage Plains west of the cross timbers strip is characterized by mesquite-grassland and the High Plains is essentially barren of vegetation except for occasional trees along the stream courses. The headwaters of the Red River arise from the eastern escarpment of the High Plains and that part of the High Plains south of the Canadian River is usually referred to as the "Llano Estacado". Marcy and McClellan (1854) reported that various major tributaries of the Red River (see our Figure 1) have high mineral levels, primarily gypsum and the mineral load varies seasonally thus limiting habitation by certain fishes. Mineral or salinity levels usually decrease in a downstream direction due in part to the influx of fresh or 'sweetwater' from tributaries and in general the number of fish species increases in a downstream direction (Buchanan et al. 2003).

Lake Texoma resulted from impoundment of the Red River by the Denison Dam and the reservoir was filled in 1944 (Riggs and Bonn 1959).

METHODS AND MATERIALS

All fishes were collected with a 10' (3.05 m) long by 6' (1.83 m) deep nylon seine with a 3/16" (1.59 mm) ace mesh. All specimens were preserved in a 10% aqueous formalin solution in the field and transported to the Tulane University Museum of Natural History in Belle Chasse, Louisiana, where after several days in the formalin solution they were washed, sorted and the fish species were identified, numerated, and catalogued into the fish collection.

Collection dates extended from 27 June 1952 to and including 19 May 1989. The authors collected the bulk of the fish specimens. Some of the early collections were obtained by former Tulane University students. We did not utilize or plot any material or literature records housed at other institutions. All collecting sites were plotted on road maps and state base maps in the field and subsequently transferred to a hand-drawn basemap. Darkened circles indicate species presence on individual distribution maps; open circles indicate species absence. Species distribution maps are based only on fishes housed at the Tulane University Museum of Natural History.

Collection data given for each of the 58 sample sites includes stream name or site location, county, field collection number when available and date, number of species and specimens collected at the site, and

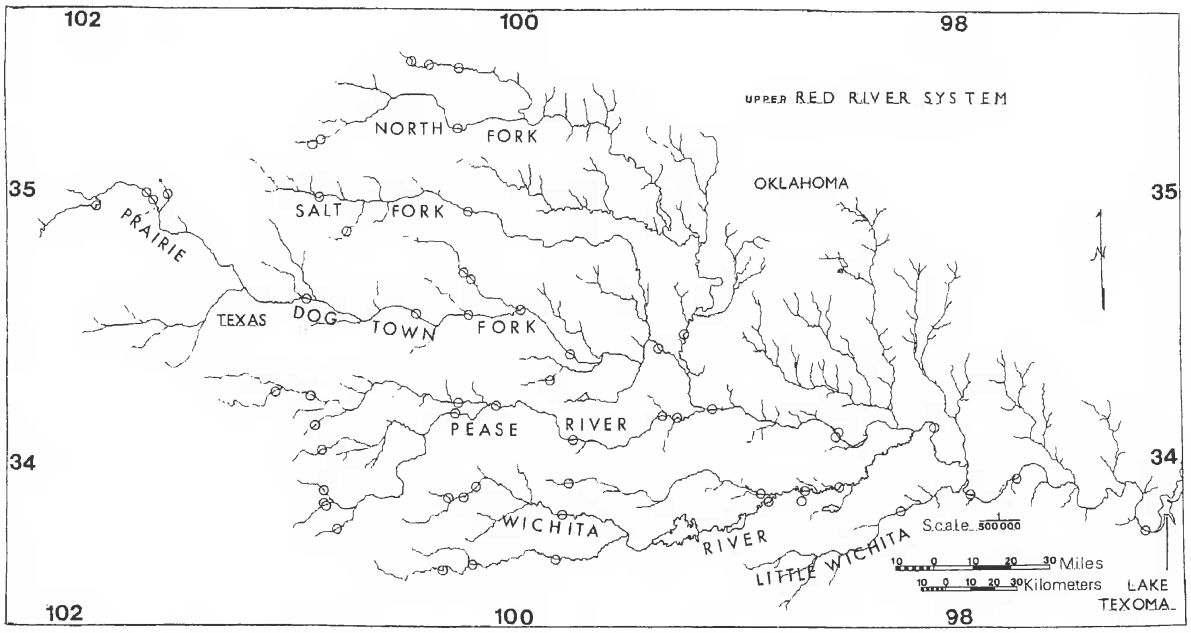


Figure 1. Upper Red River system with names of major tributaries.

a total list of species. The following abbreviations are used: mi. = mile(s), trib. = tributary, Hwy. = Highway, and Co. = County. All distances are given in miles to the nearest tenth as measured in the field and recorded in the permanent catalog in the Tulane University Museum of Natural History.

A checklist of fishes collected in the upper part of the Red River system is given with map numbers, number of sites, and specimens collected per species (Appendix). Families are arranged in phylogenetic order and species within families in alphabetical order as given in the 2004 scientific and common names checklist (Nelson et al. 2004).

RESULTS AND DISCUSSION

A total of 84 collections taken at 58 sites (Figure 2) during this study resulted in the collection of 98,210 specimens which represented 45 species plus one hybrid combination. Slightly more than 84% (82,581) of the specimens collected represented five species. Twenty-five species, plus one hybrid, each made up less than 0.1% of total specimens. The plains minnow, *Hybognathus placitus*, was the most abundant species with 31,907 specimens comprising 32.5% of the total specimens. *Notropis bairdi* (Red River shiner) was the second most abundant species with 17,022 specimens and made up 17.3% of total. *Cyprinella lutrensis* (red shiner) was the third most abundant with 15,021 specimens and made up 15.3% of total.

Cyprinella lutrensis (red shiner) was taken at 47 (81.0%) of the 58 collecting sites. *Fundulus zebrinus* (plains killifish) was taken at 41 (70.7%) of the 58 collecting sites; *Gambusia affinis* (western mosquitofish) was taken at 37 (63.8%) of the 58 sites; *Lepomis cyanellus* (green sunfish) was taken at 35 sites (60.3%); *Cyprinodon rubrofluviatilis* (Red River pupfish) was taken at 34 sites (58.6%); and *Notropis bairdi* (Red River shiner) was taken at 32 sites (55.2%).

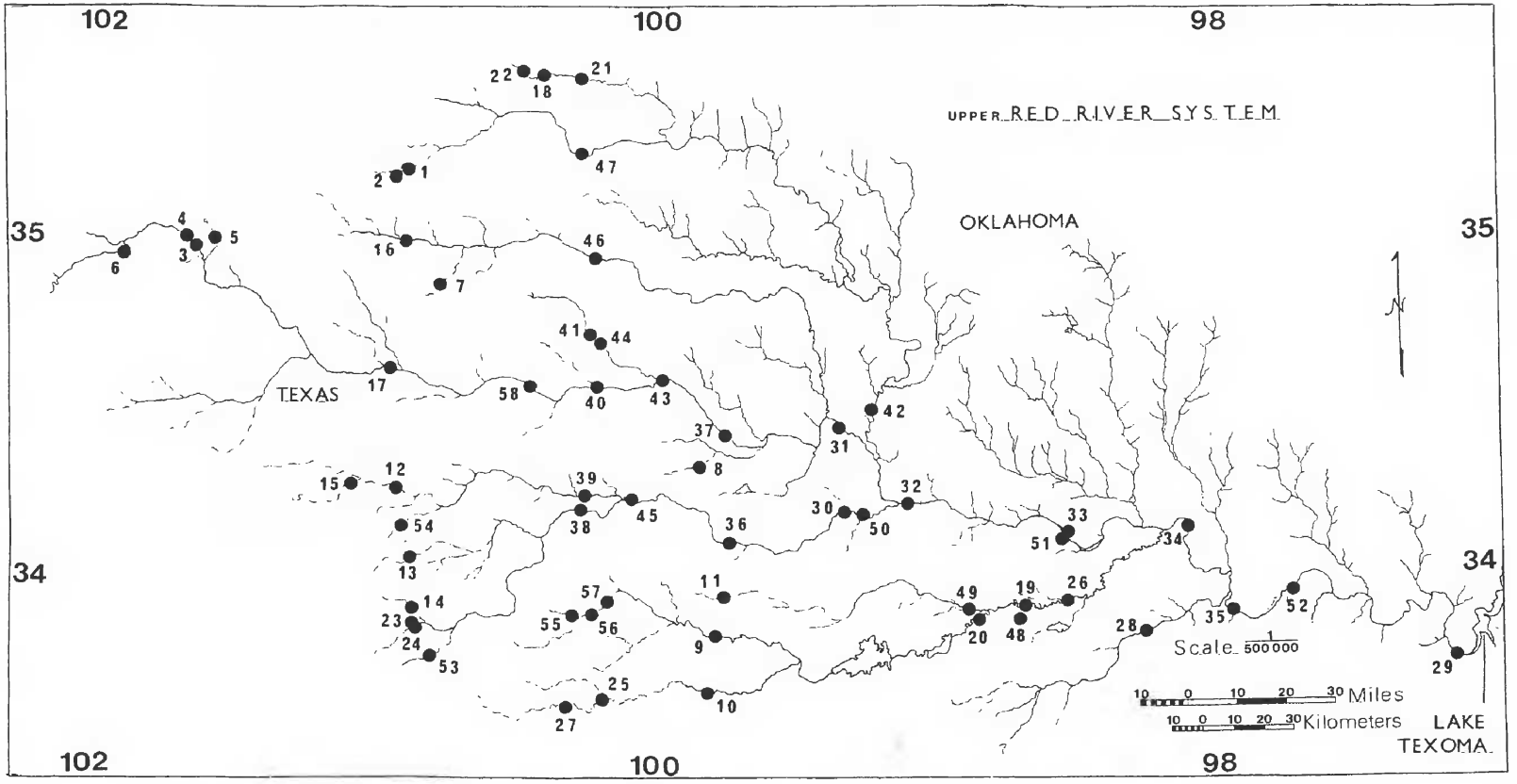
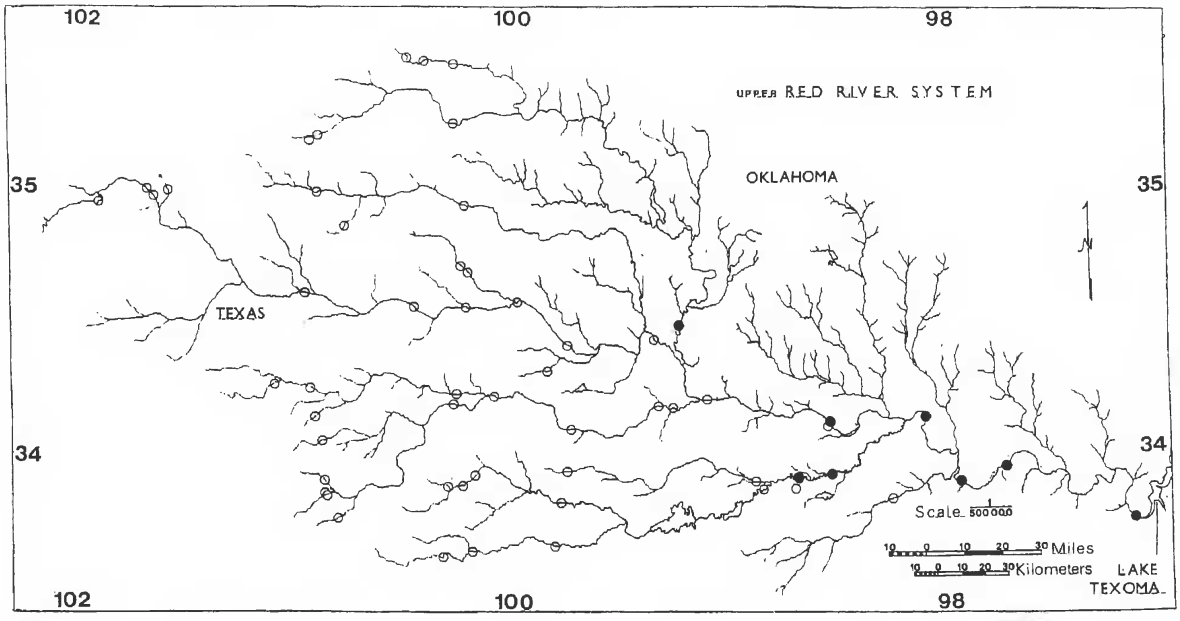
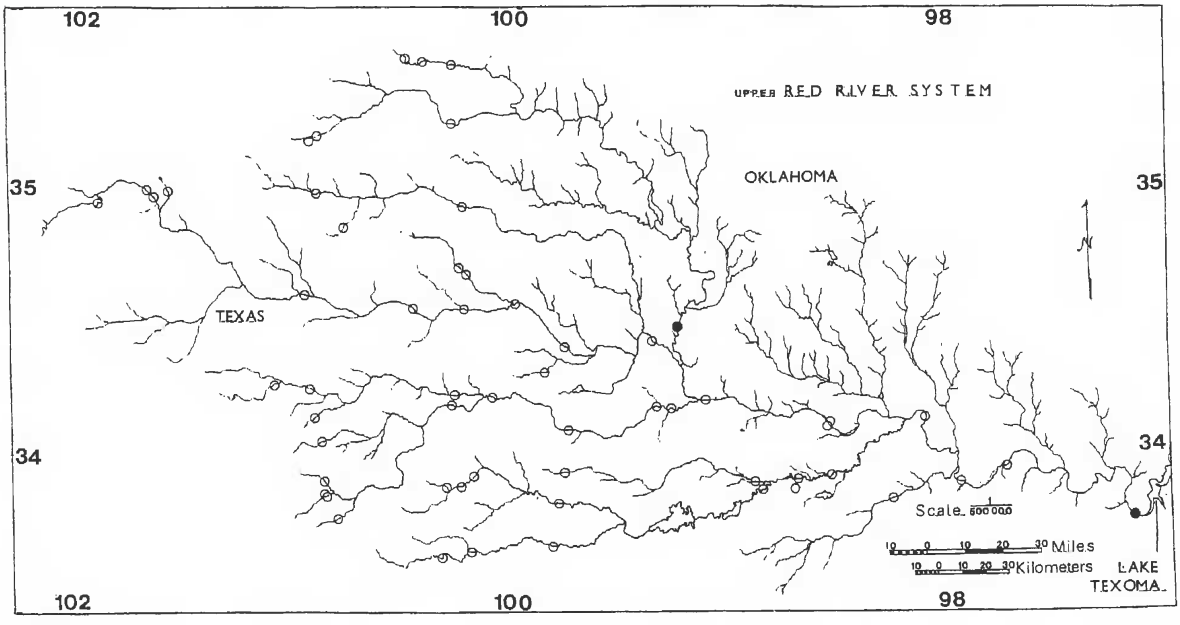


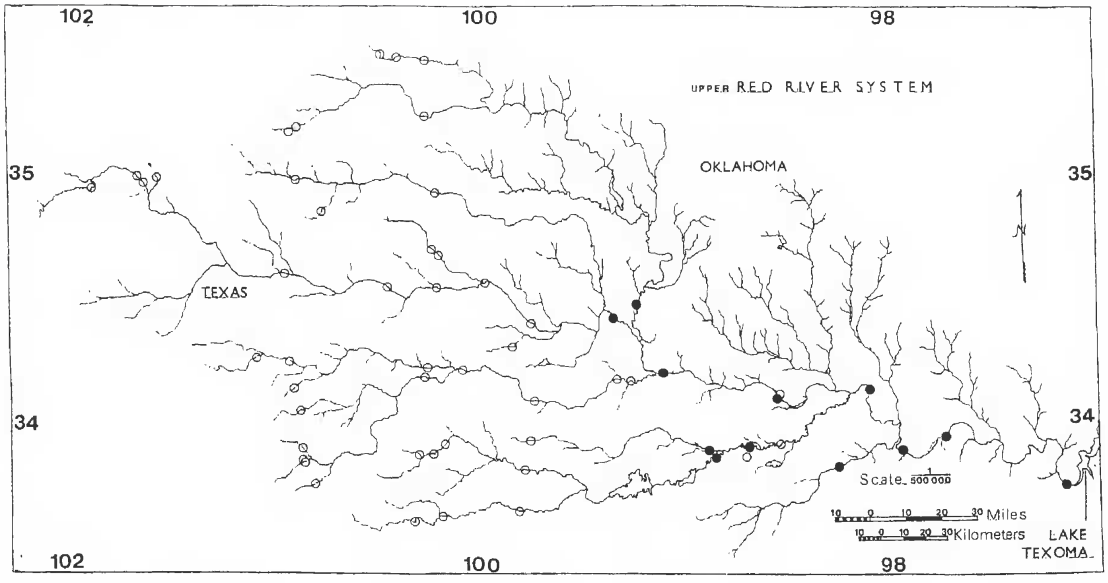
Figure 2. Collecting sites in the upper Red River system in Texas and Oklahoma.



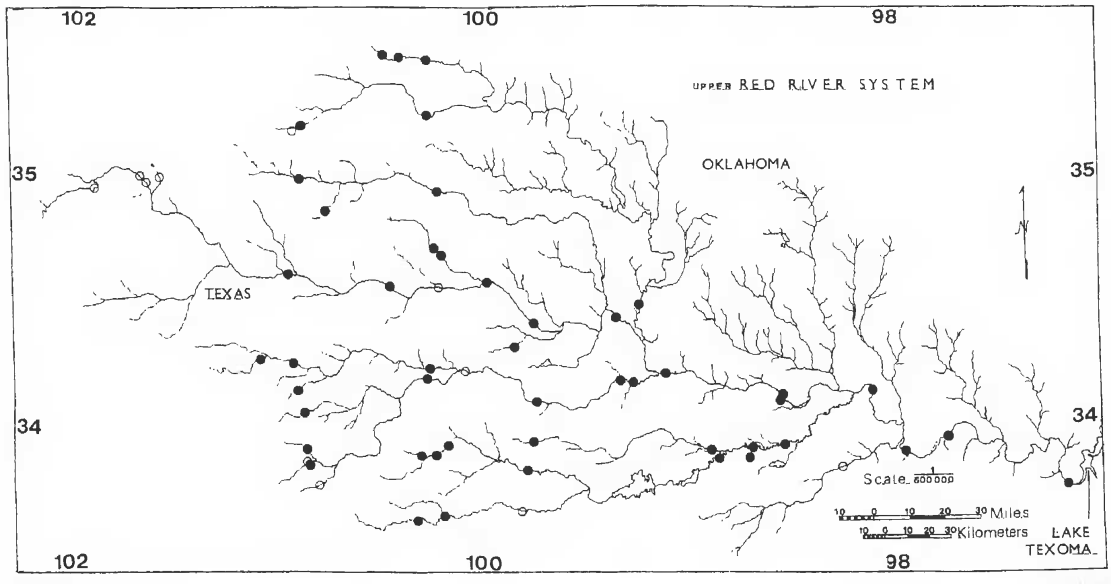
Map 1
Lepisosteidae gars
Lepisosteus osseus (Linnaeus, 1758)
longnose gar
8 sites 19 specimens



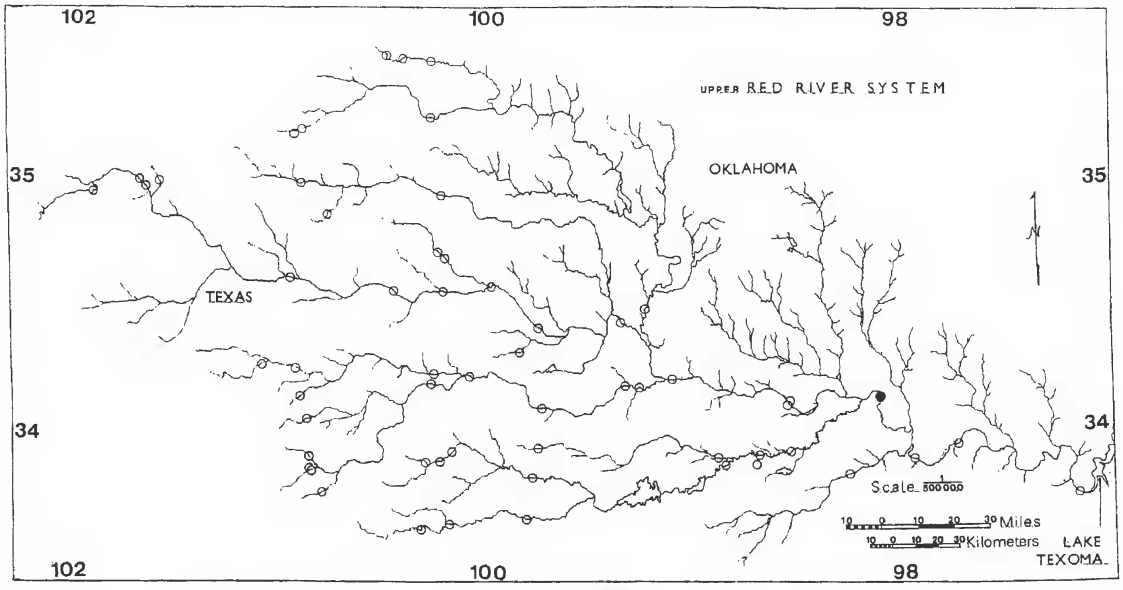
Map 2
Hiodontidae mooneyes
Hiodon alosoides (Rafinesque, 1819)
goldeye
2 sites 2 specimens



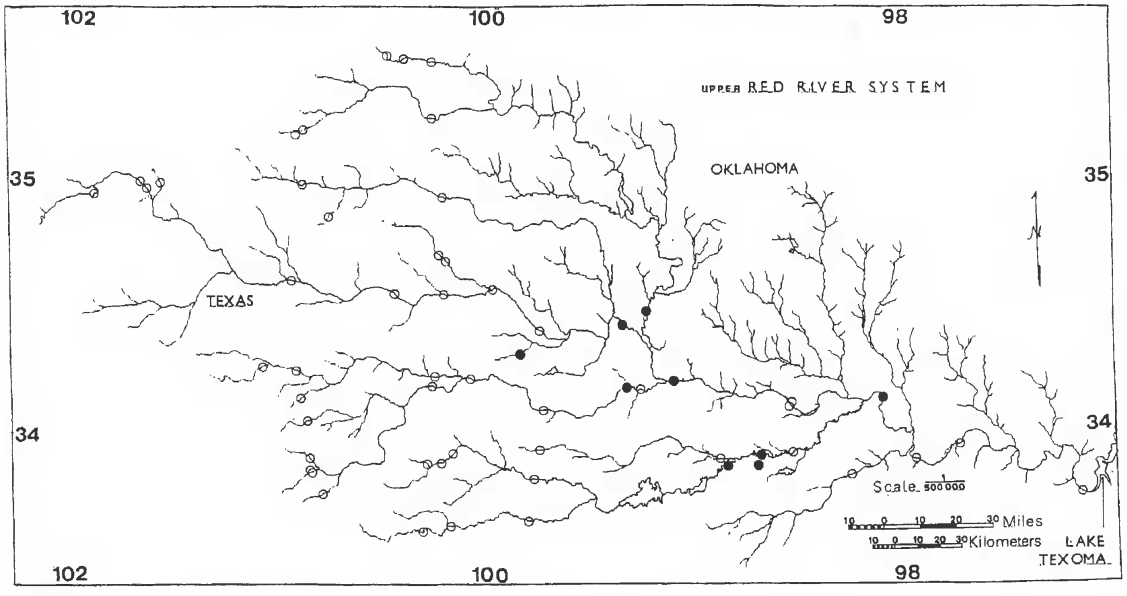
Map 3
Clupeidae herrings
Dorosoma cepedianum (Lesueur, 1818)
gizzard shad
12 sites 1,177 specimens



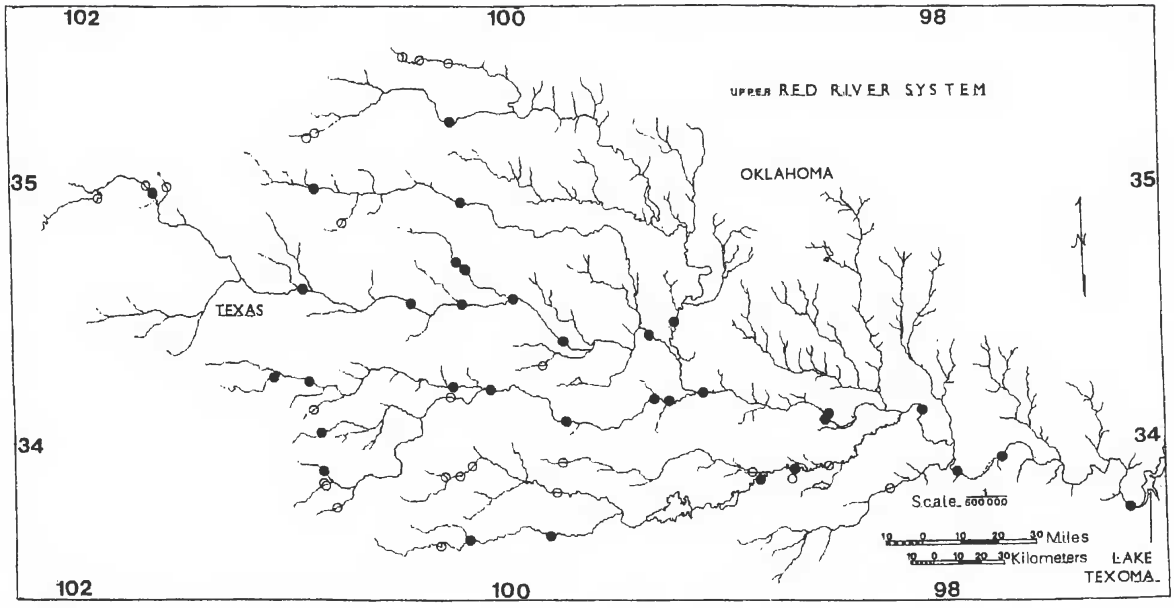
Map 4
Cyprinidae minnows
Cyprinella lutrensis (Baird & Girard, 1853)
red shiner
47 sites 15,021 specimens



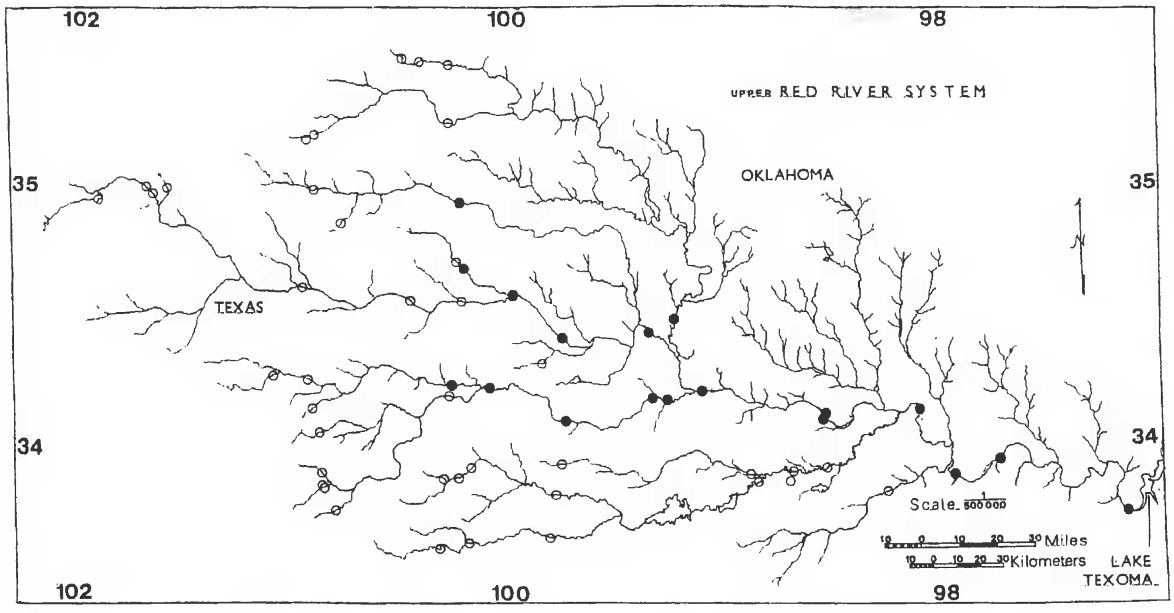
Map 5
Cyprinidae minnows
Cyprinella venusta Girard, 1856
blacktail shiner
1 site 5 specimens



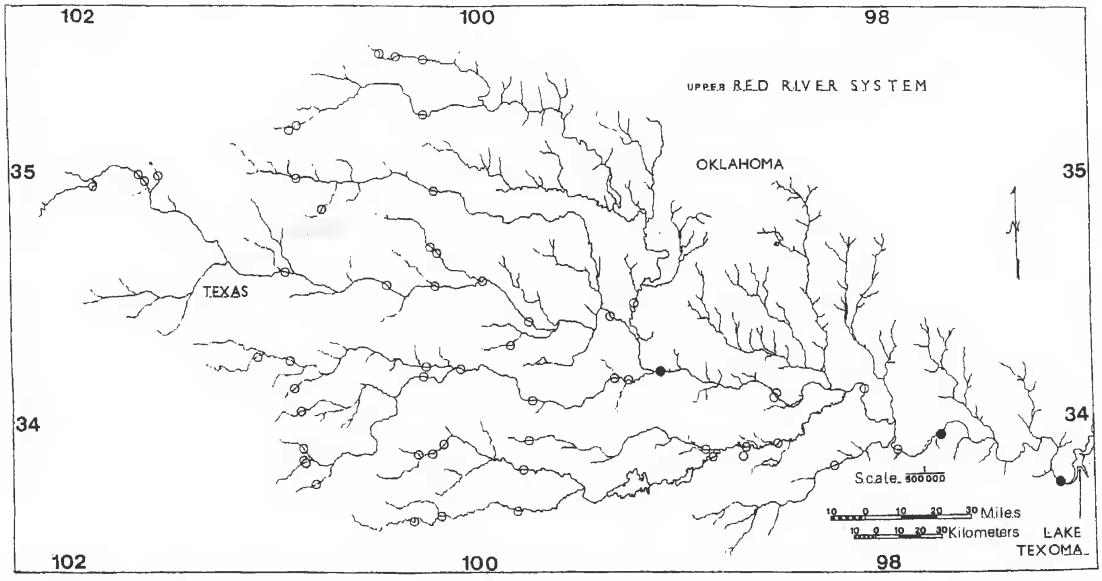
Map 6
Cyprinidae minnows
Cyprinus carpio Linnaeus, 1758
common carp
9 sites 46 specimens



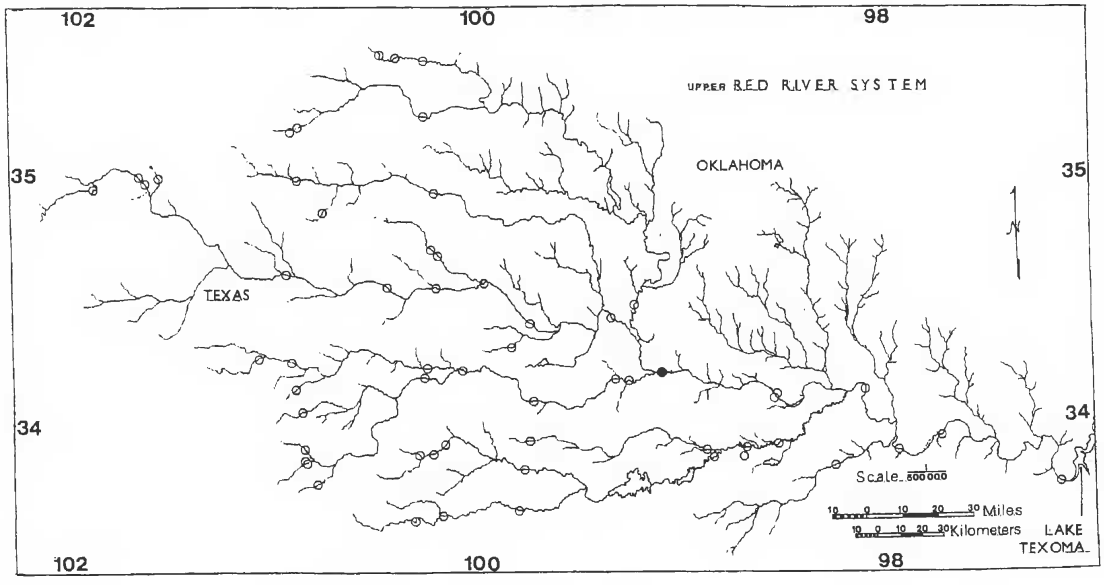
Map 7
Cyprinidae minnows
Hybognathus placitus Girard, 1856
plains minnow
33 sites 31,907 specimens



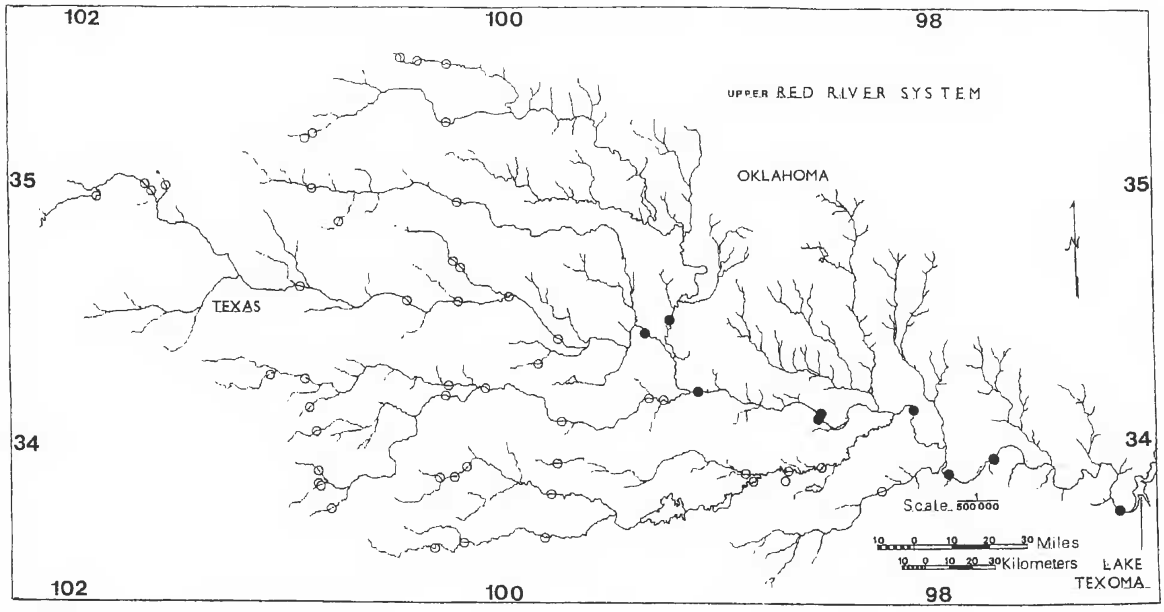
Map 8
Cyprinidae minnows
Macrhybopsis australis (Hubbs and Ortenburger, 1929)
prairie chub
18 sites 3,121 specimens



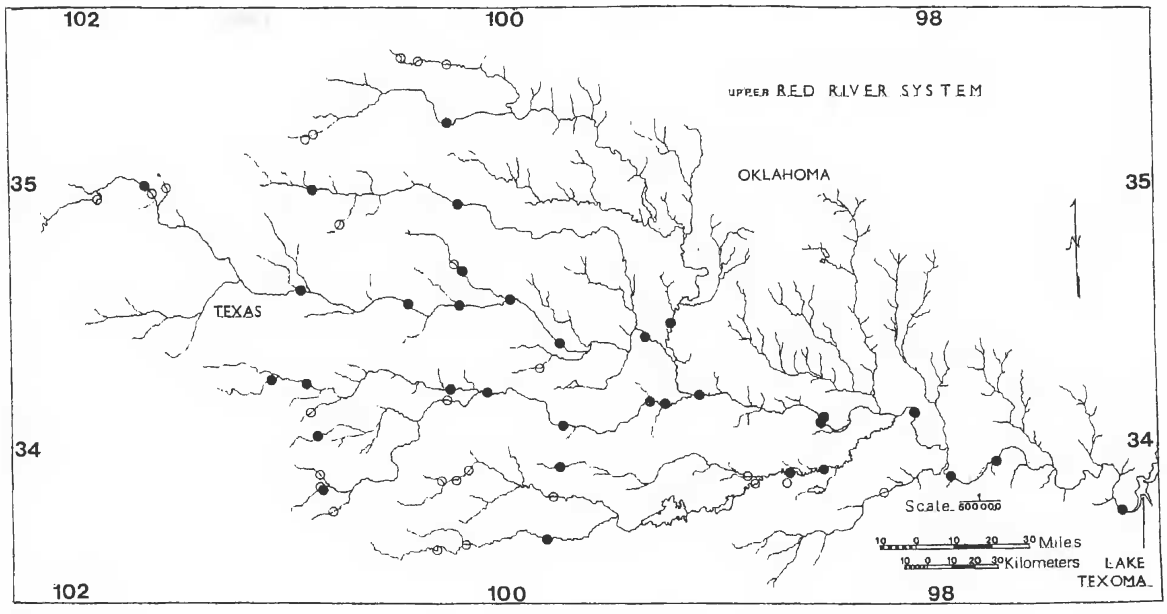
Map 9
Cyprinidae minnows
Macrhybopsis storeriana (Kirtland, 1845)
silver chub
3 sites 26 specimens



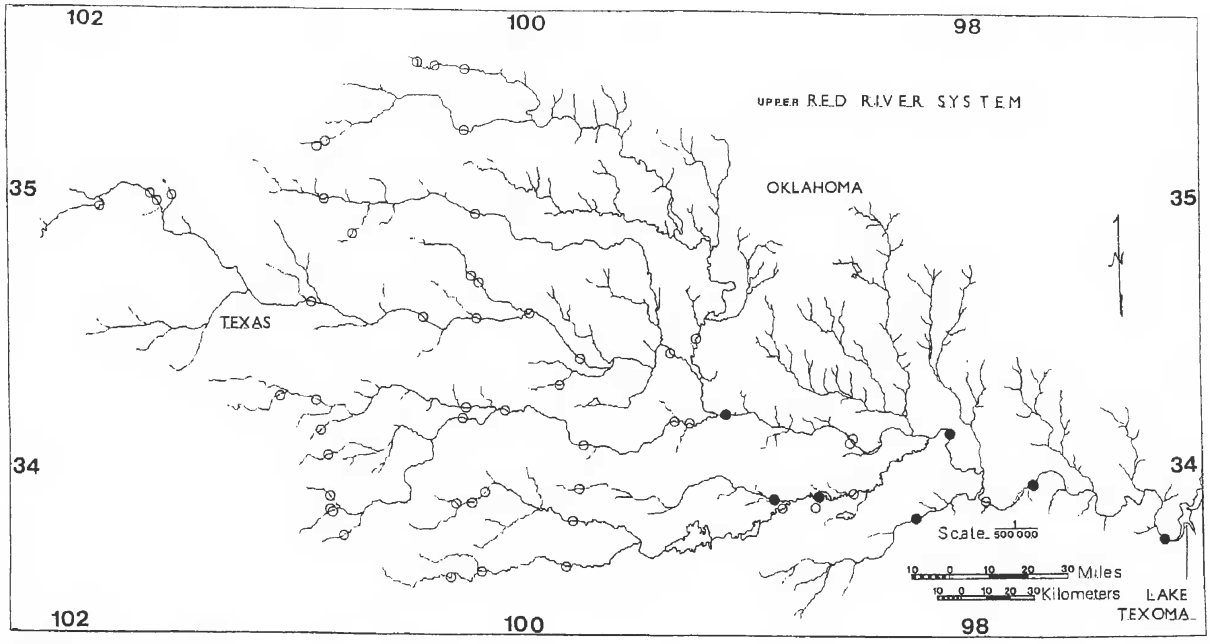
Map 10
Cyprinidae minnows
Notemigonus crysoleucas (Mitchill, 1814)
golden shiner
1 site 1 specimen



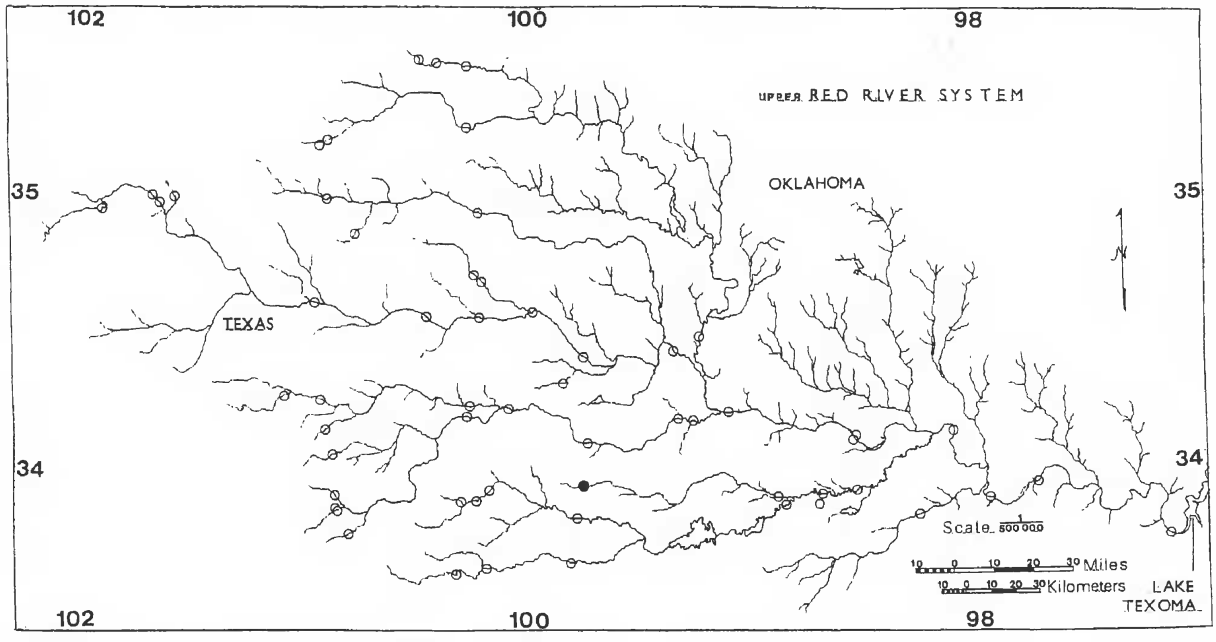
Map 11
Cyprinidae minnows
Notropis atherinoides Rafinesque, 1818
emerald shiner
9 sites 2,483 specimens



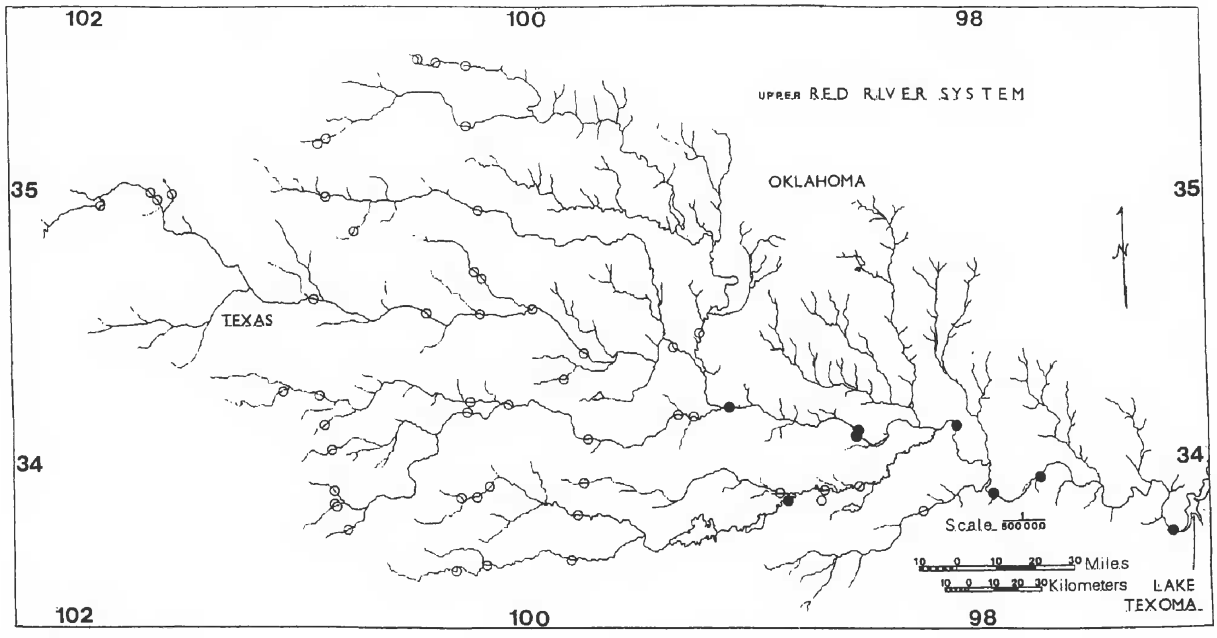
Map 12
Cyprinidae minnows
Notropis bairdi Hubbs and Ortenburger, 1929
Red River shiner
32 sites 17,022 specimens



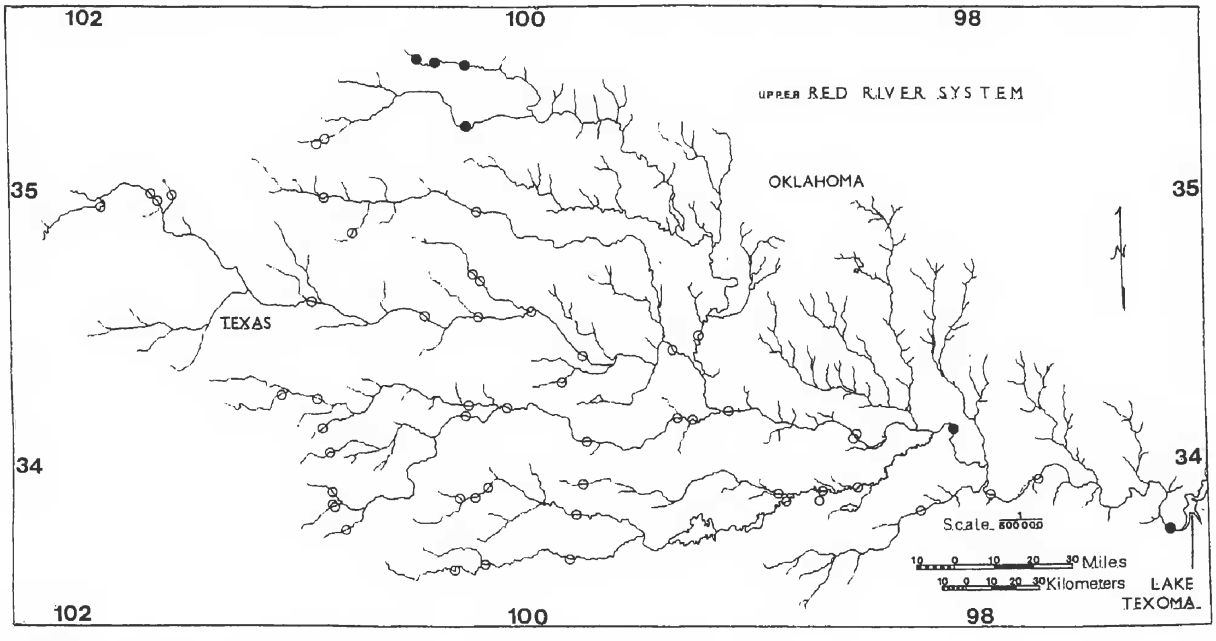
Map 13
Cyprinidae minnows
Notropis buchanani Meek, 1896
ghost shiner
7 sites 260 specimens



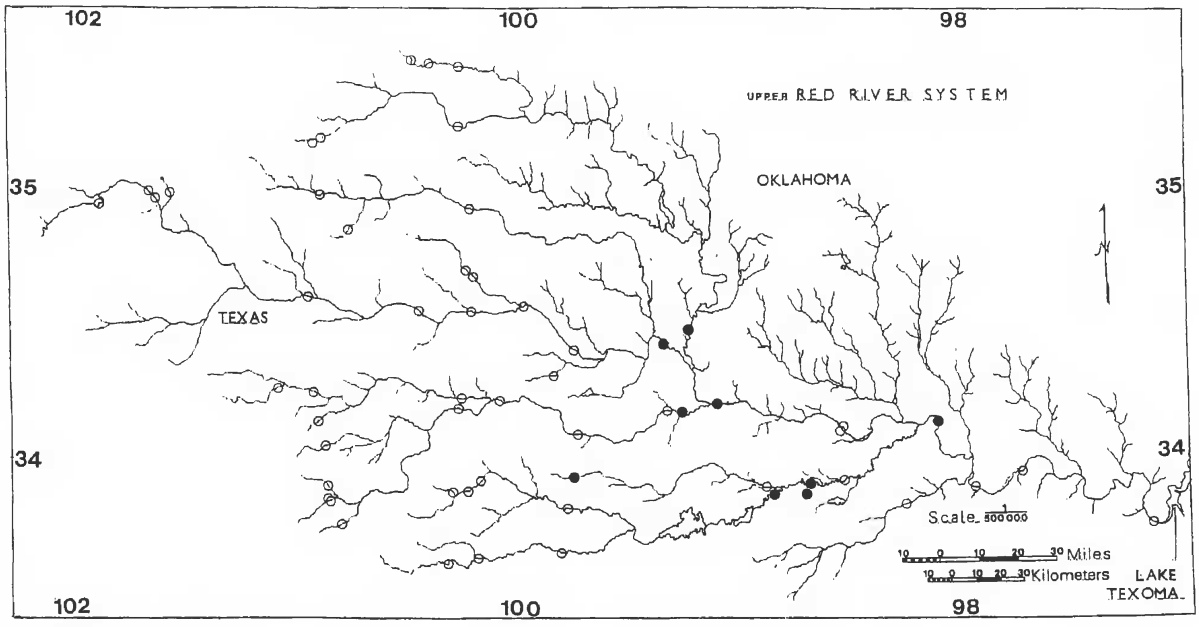
Map 14
Cyprinidae minnows
Notropis oxyrhynchus Hubbs & Bonham, 1951
sharpnose shiner
1 site 8 specimens



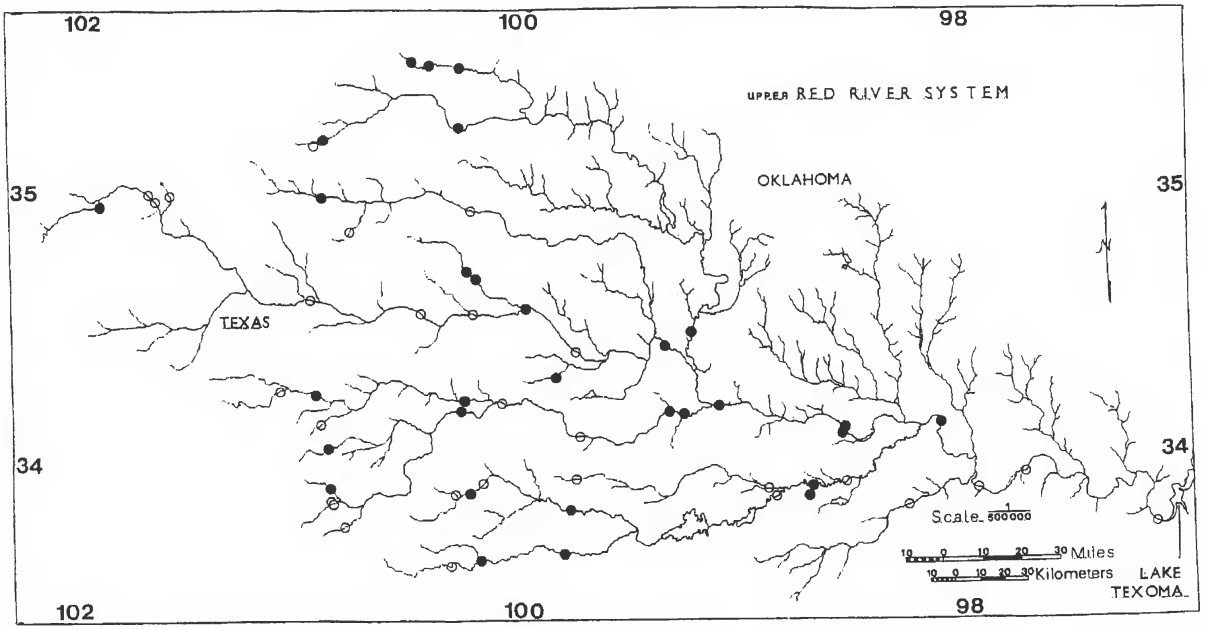
Map 15
Cyprinidae minnows
Notropis potteri Hubbs & Bonham, 1951
chub shiner
8 sites 1,220 specimens



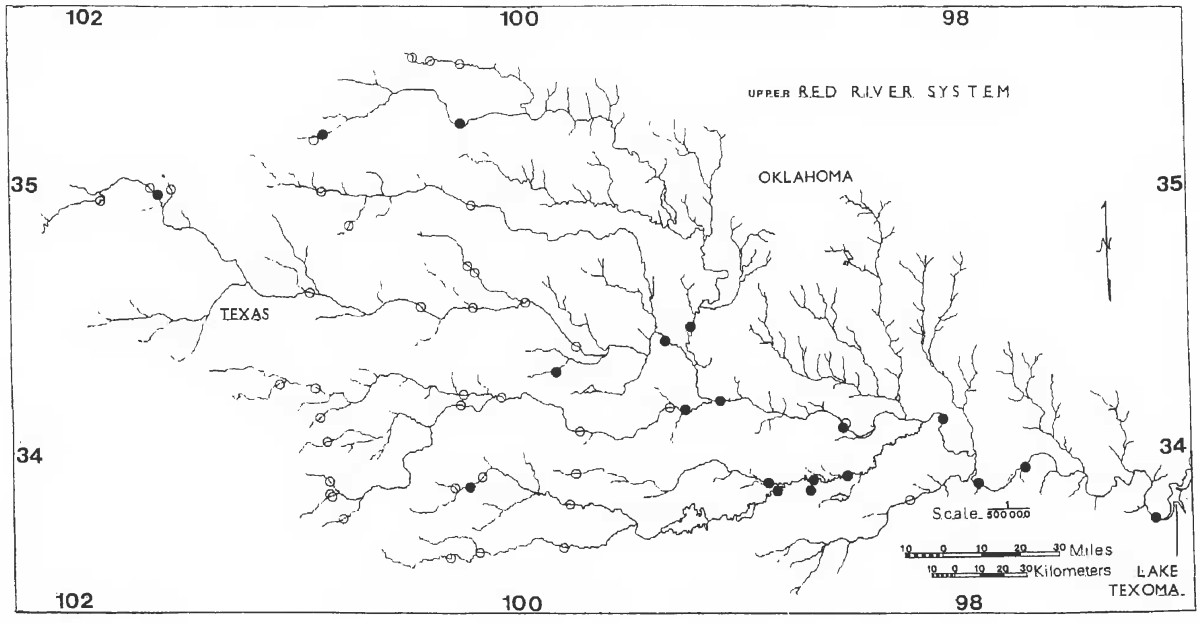
Map 16
Cyprinidae minnows
Notropis stramineus (Cope, 1865)
sand shiner
6 sites 127 specimens



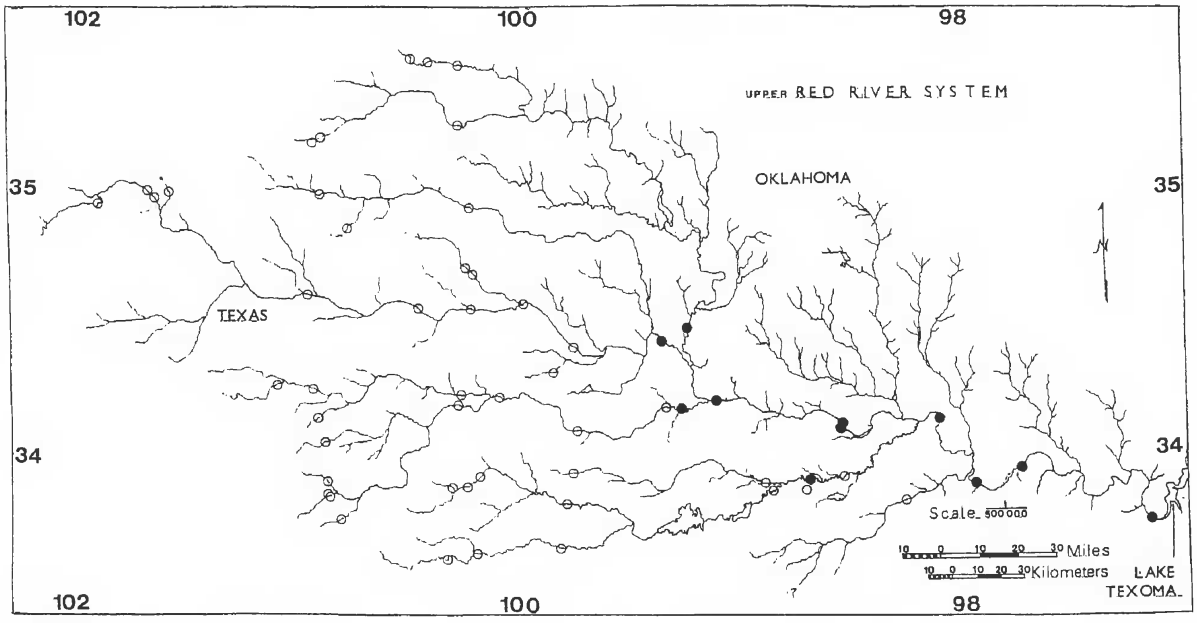
Map 17
Cyprinidae minnows
Phenacobius mirabilis (Girard, 1856)
suckermouth minnow
9 sites 60 specimens



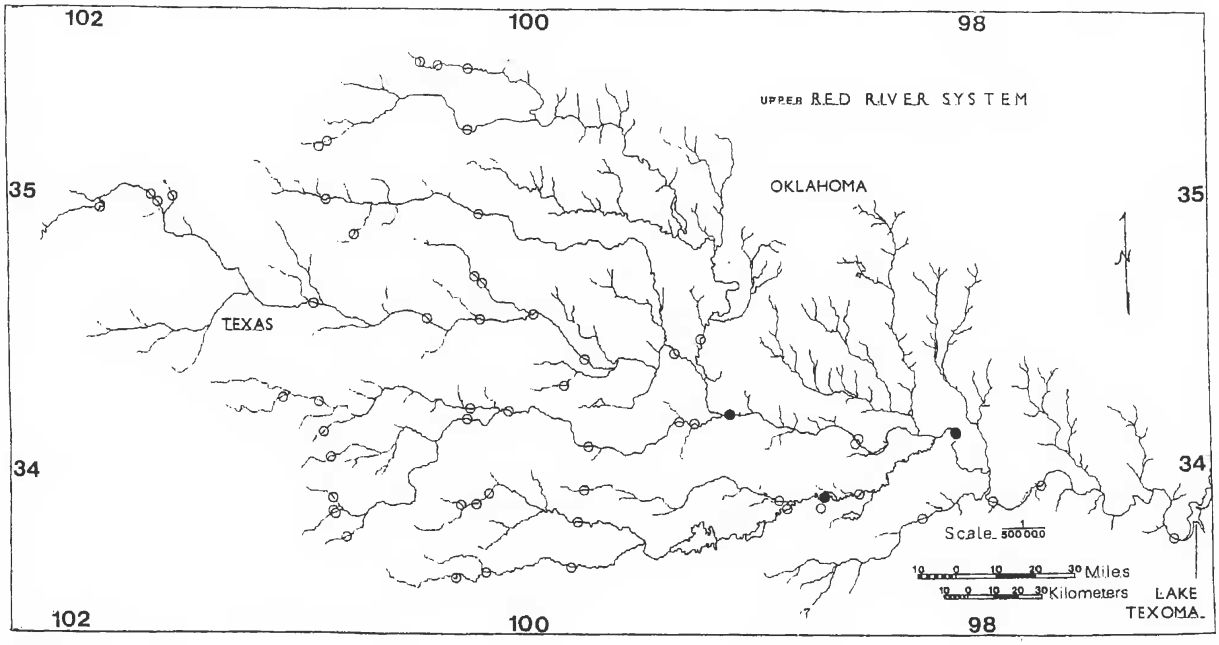
Map 18
Cyprinidae minnows
Pimephales promelas Rafinesque, 1820
fathead minnow
30 sites 990 specimens



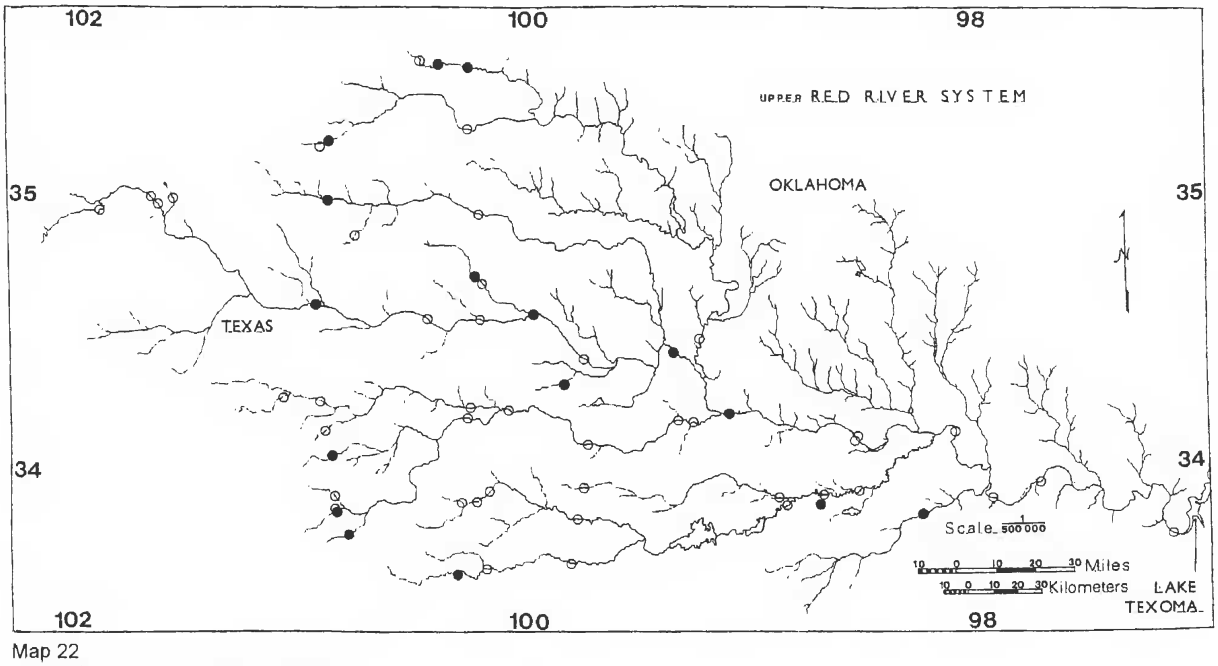
Map 19
Cyprinidae minnows
Pimephales vigilax (Baird & Girard, 1853)
bullhead minnow
19 sites 821 specimens



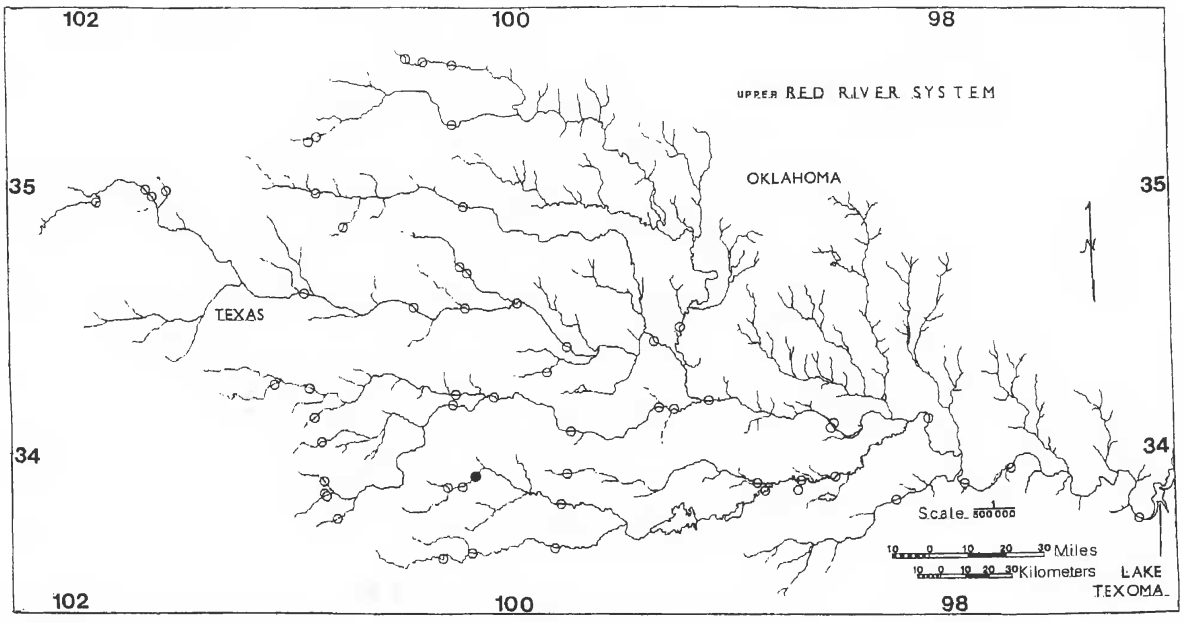
Map 20
Catostomidae suckers
Carpiodes carpio (Rafinesque, 1820)
river carpsucker
11 sites 1,814 specimens



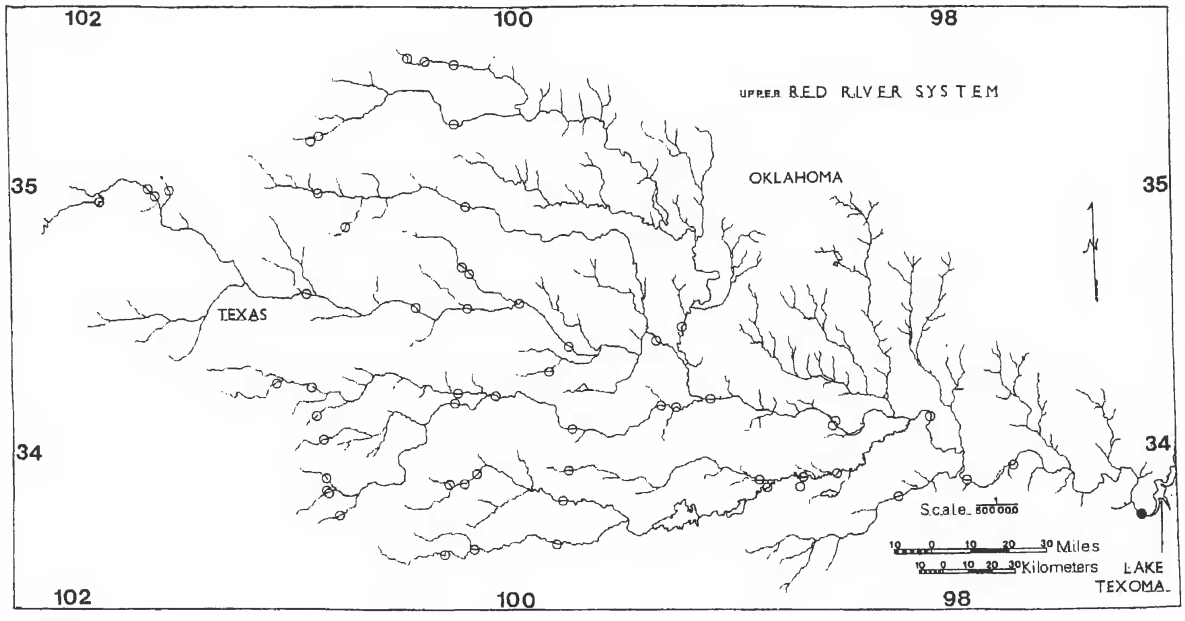
Map 21
Catostomidae suckers
Ictiobus bubalus (Rafinesque, 1818)
smallmouth buffalo
3 sites 25 specimens



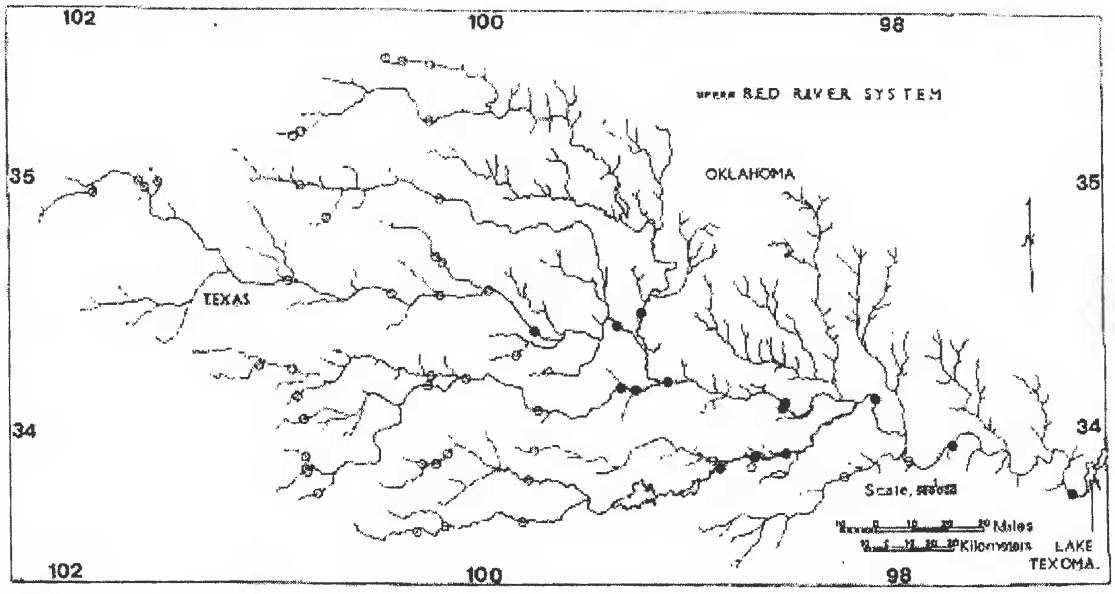
Map 22
Ictaluridae North American catfishes
Ameiurus melas (Rafinesque, 1820)
black bullhead
16 sites 53 specimens



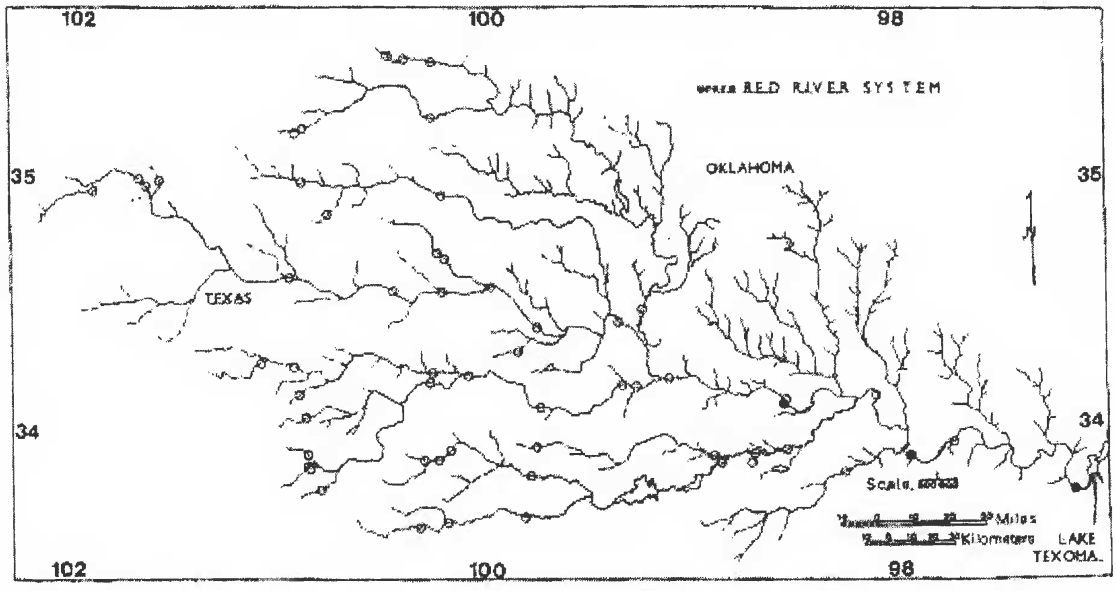
Map 23
Ictaluridae North American catfishes
Ameiurus natalis (Lesueur, 1819)
yellow bullhead
1 site 1 specimen



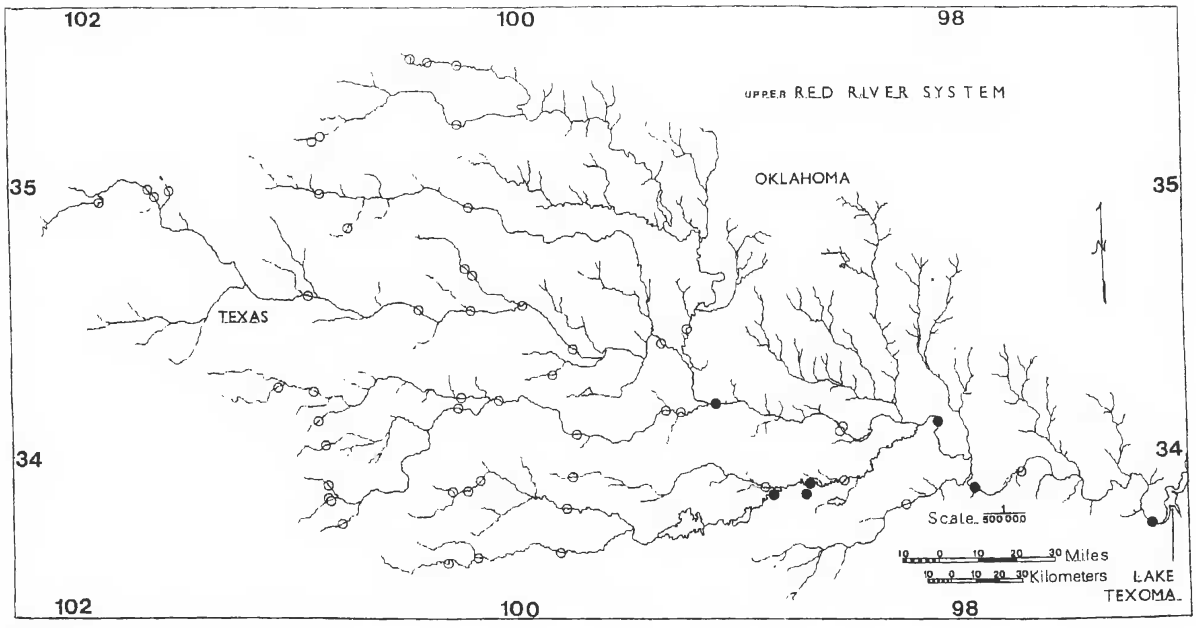
Map 24
Ictaluridae North American catfishes
Ictalurus furcatus (Lesueur, 1840)
blue catfish
1 site 25 specimens



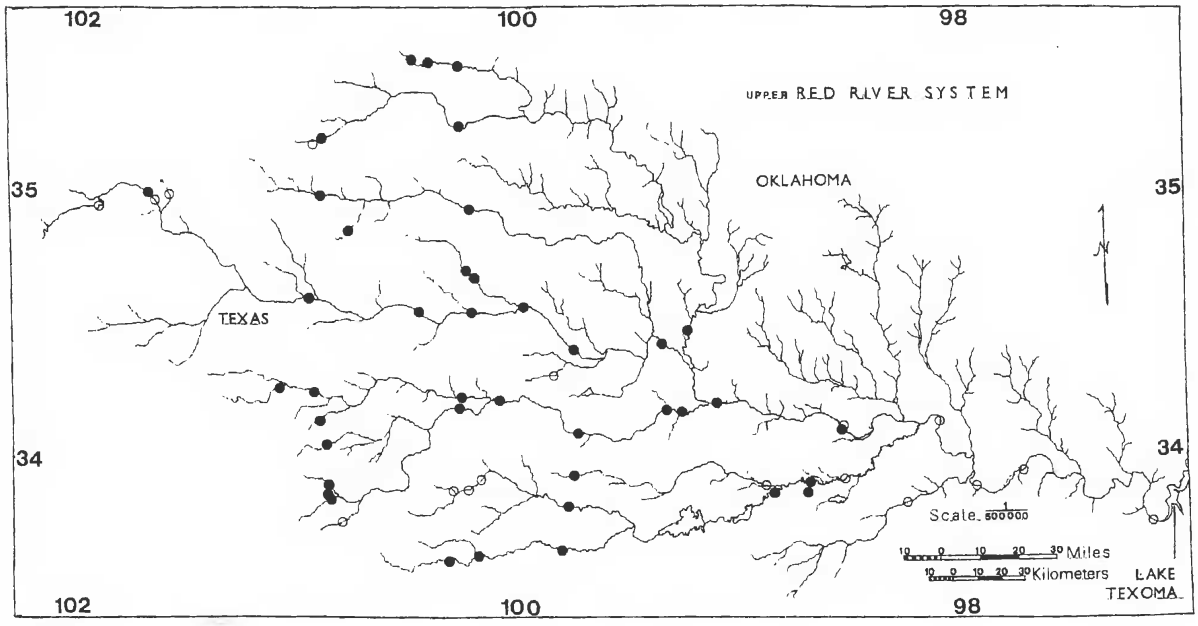
Map 25
Ictaluridae North American catfishes
Ictalurus punctatus (Rafinesque, 1818)
channel catfish
14 sites 306 specimens



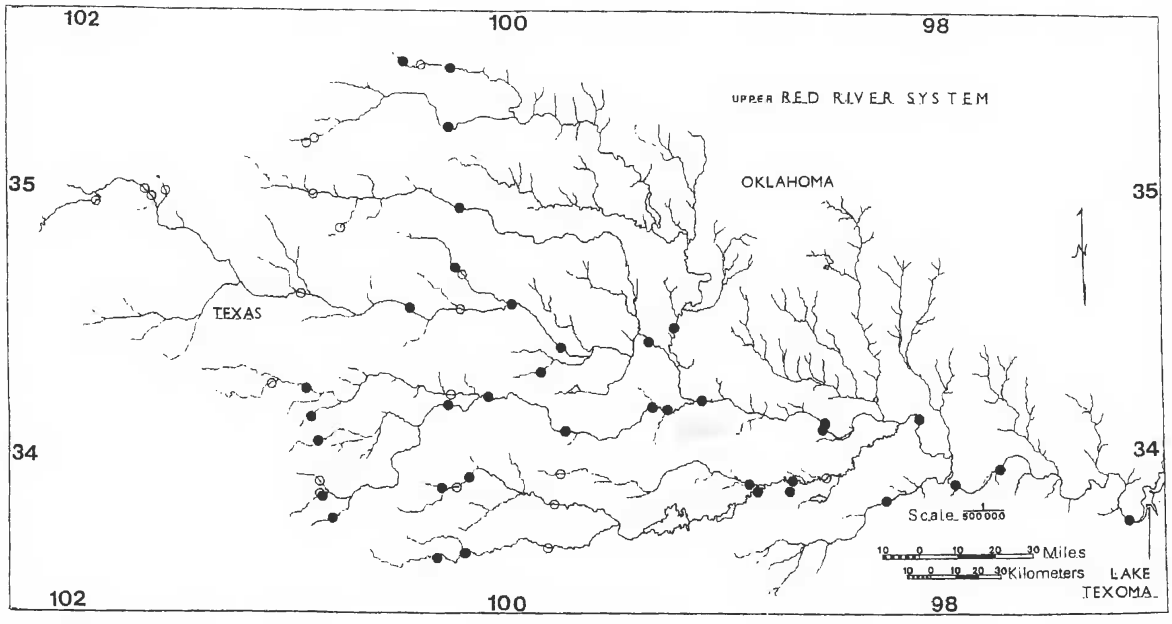
Map 26
Ictaluridae North American catfishes
Pylodictis olivaris (Rafinesque, 1818)
flathead catfish
3 sites 10 specimens



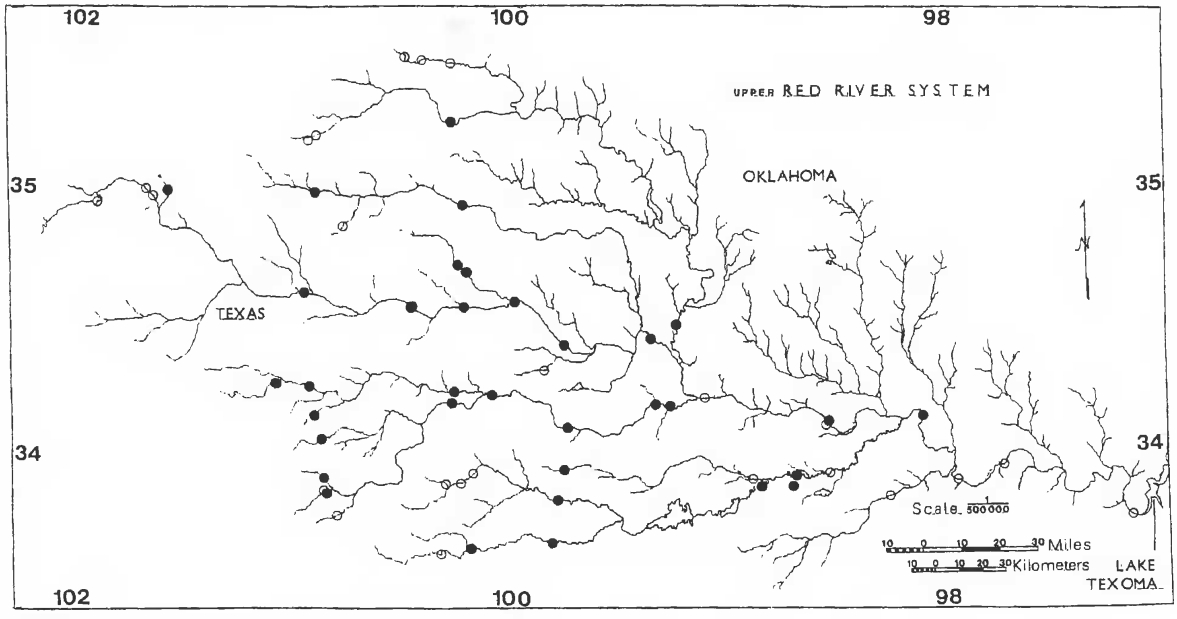
Map 27
Atherinopsidae New World silversides
Menidia audens Hay, 1882
Mississippi silverside
7 sites 809 specimens



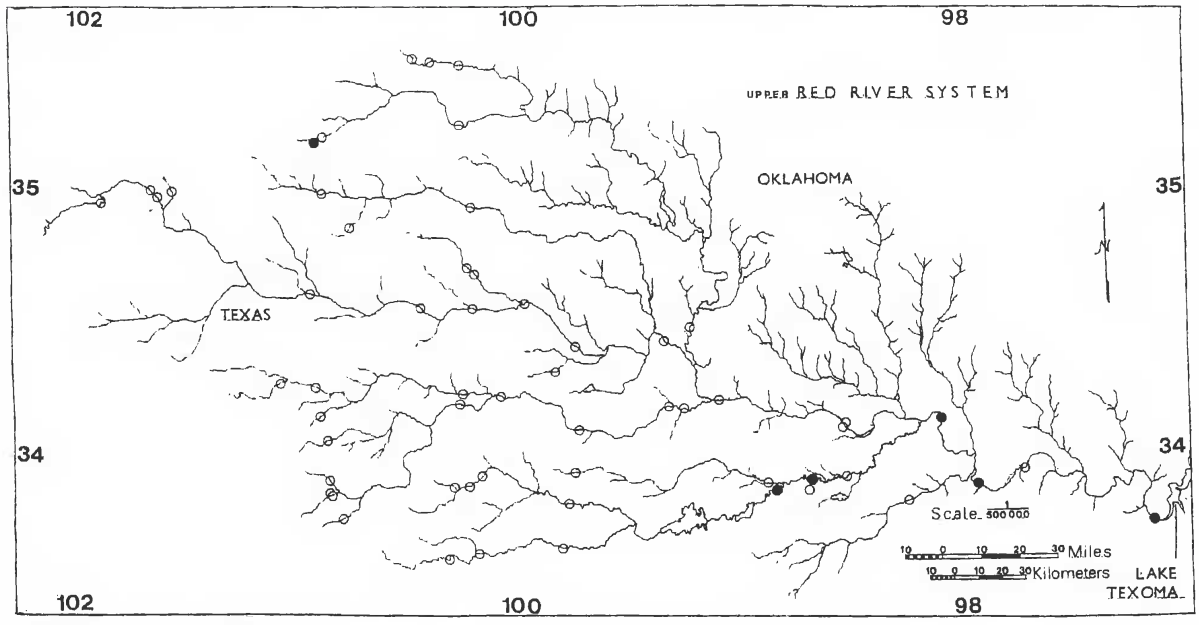
Map 28
Fundulidae topminnows
Fundulus zebrinus Jordan & Gilbert, 1883
plains killifish
41 sites 7,101 specimens



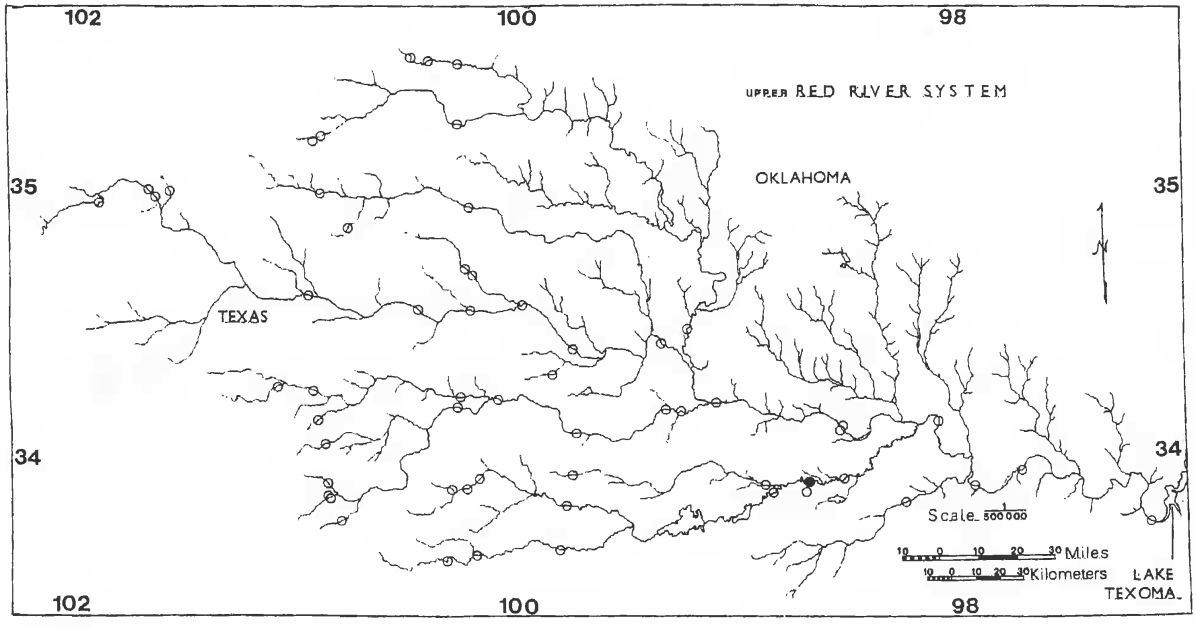
Map 29
Poeciliidae livebearers
Gambusia affinis (Baird & Girard, 1853)
western mosquitofish
37 sites 1,381 specimens



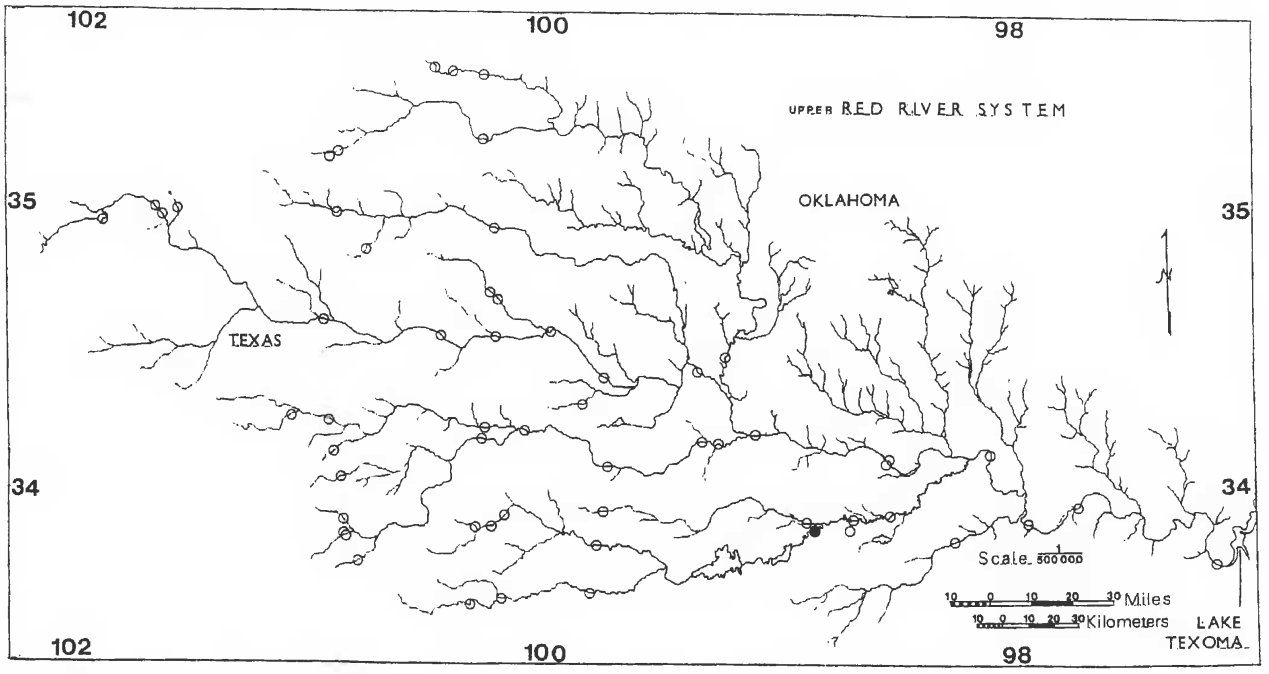
Map 30
Cyprinodontidae pupfishes
Cyprinodon rubrofluviatilis Fowler, 1916
Red River pupfish
34 sites 11,530 specimens



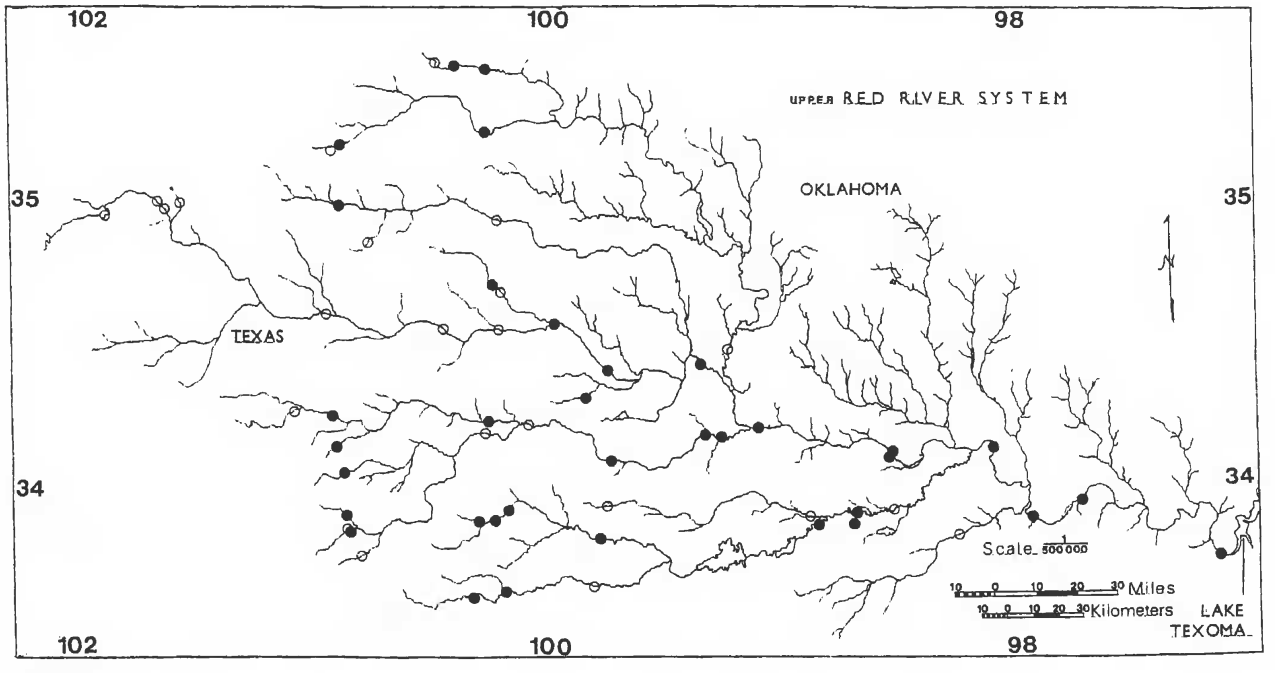
Map 31
Moronidae temperate basses
Morone chrysops (Rafinesque, 1820)
white bass
6 sites 33 specimens



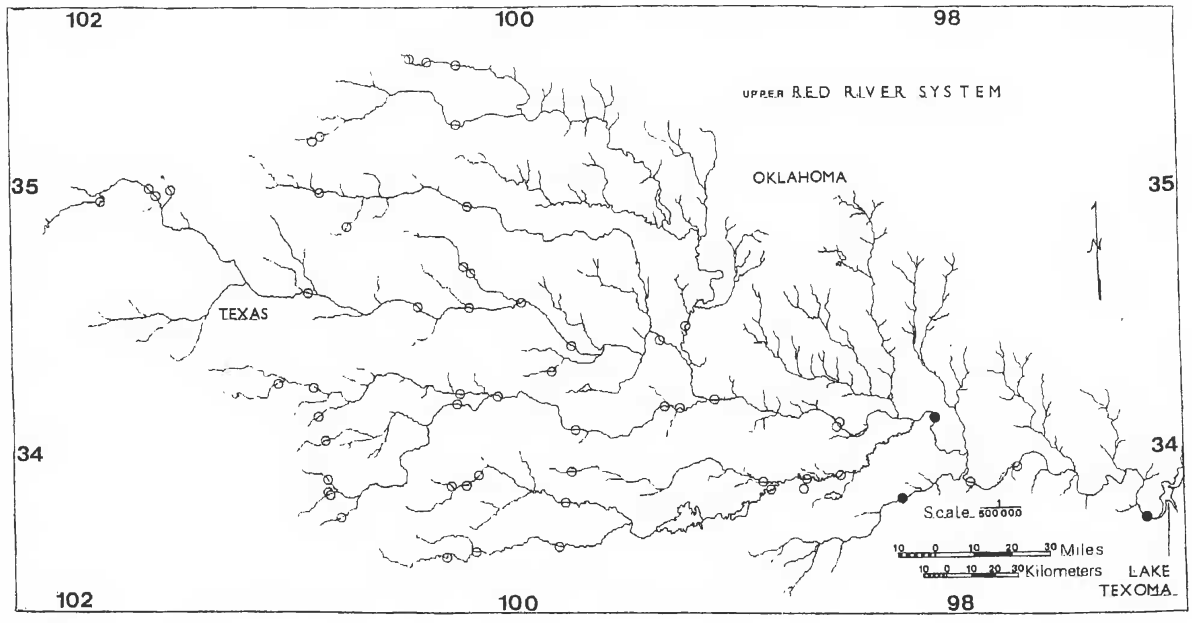
Map 32
Moronidae temperate basses
Morone chrysops x *M. saxatilis*
palmetto bass
1 site specimen 1 specimen



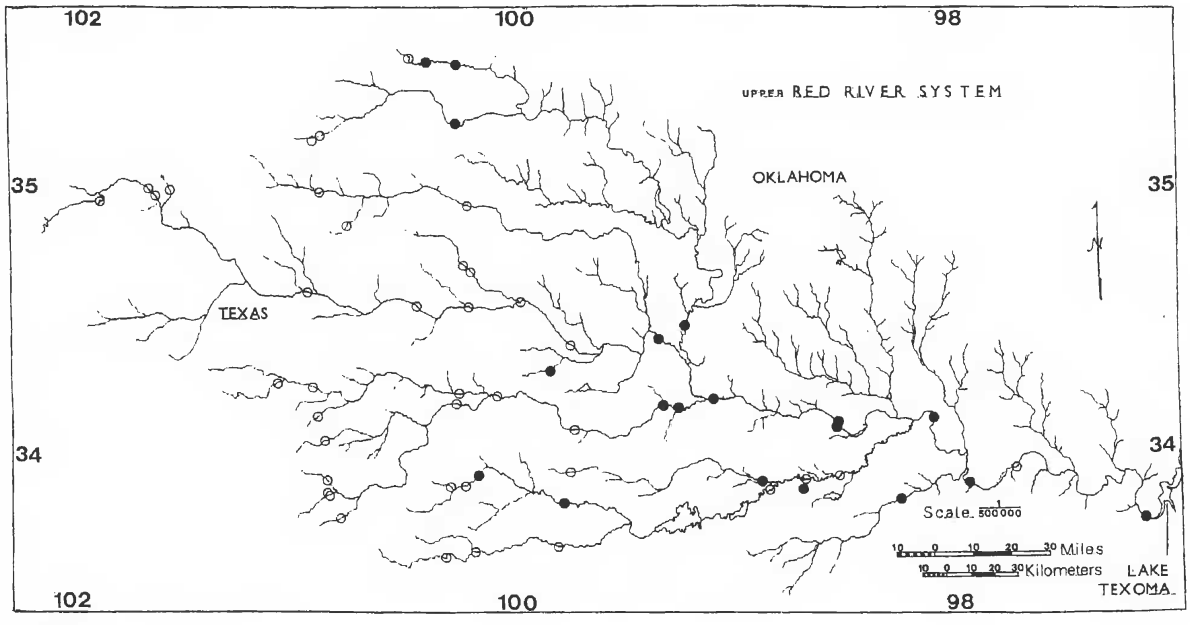
Map 33
Moronidae temperate basses
Morone saxatilis (Walbaum, 1792)
striped bass
1 site 2 specimens



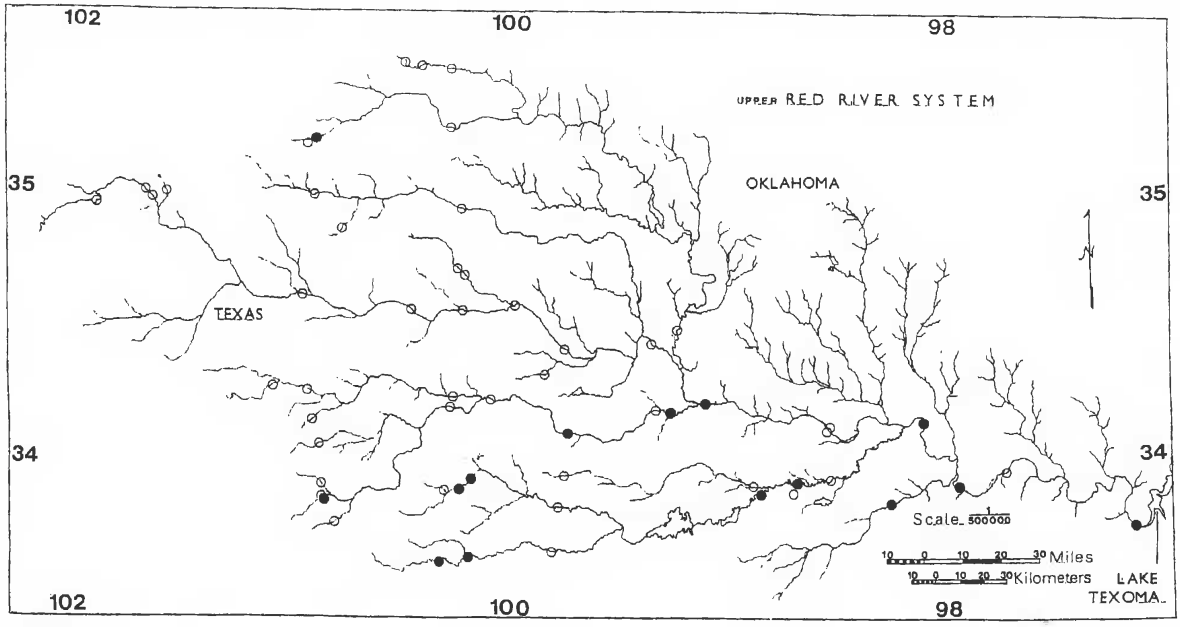
Map 34
Centrarchidae sunfishes
Lepomis cyanellus Rafinesque, 1819
green sunfish
35 sites 278 specimens



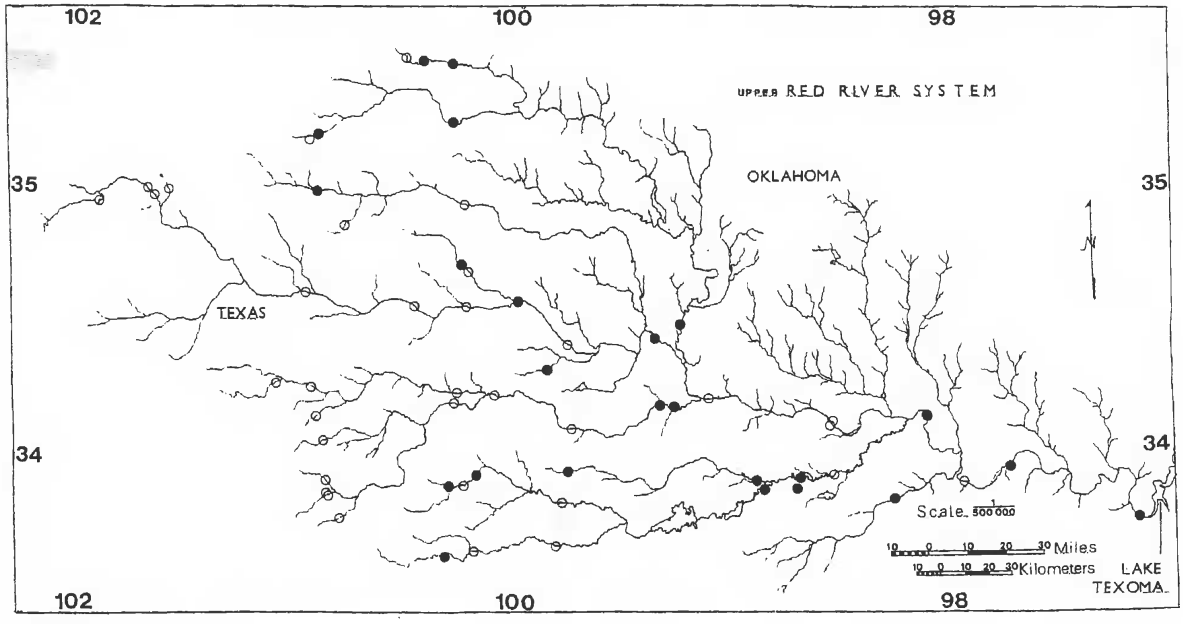
Map 35
Centrarchidae sunfishes
Lepomis gulosus (Cuvier, 1829)
warmouth
3 sites 3 specimens



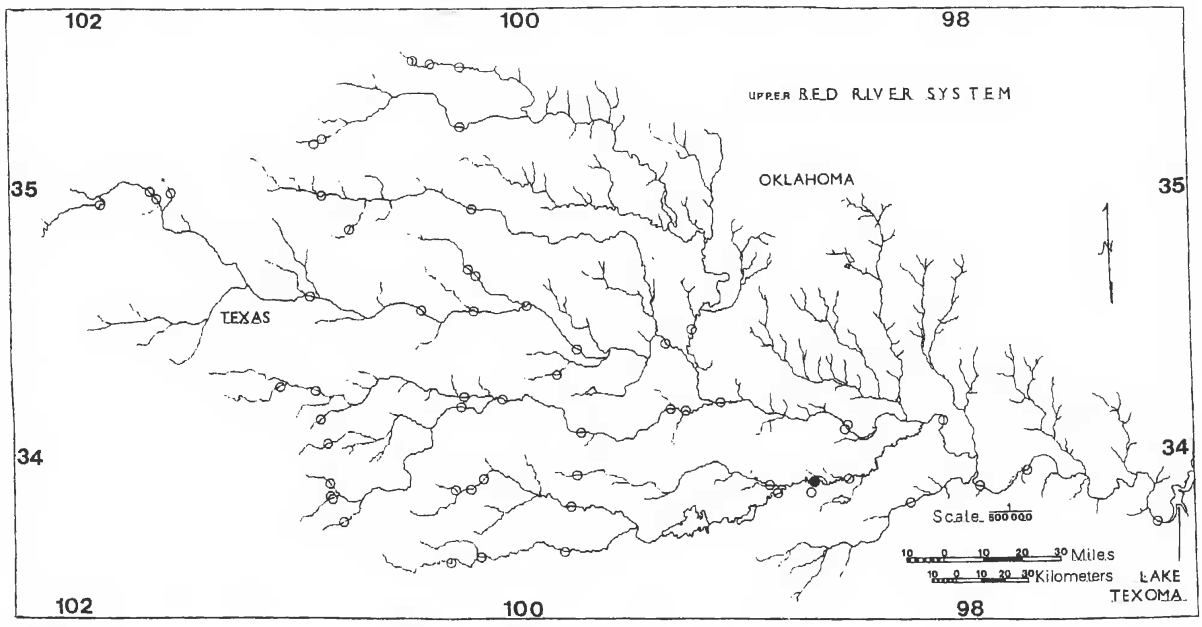
Map 36
Centrarchidae sunfishes
Lepomis humilis (Girard, 1858)
orangespotted sunfish
19 sites 184 specimens



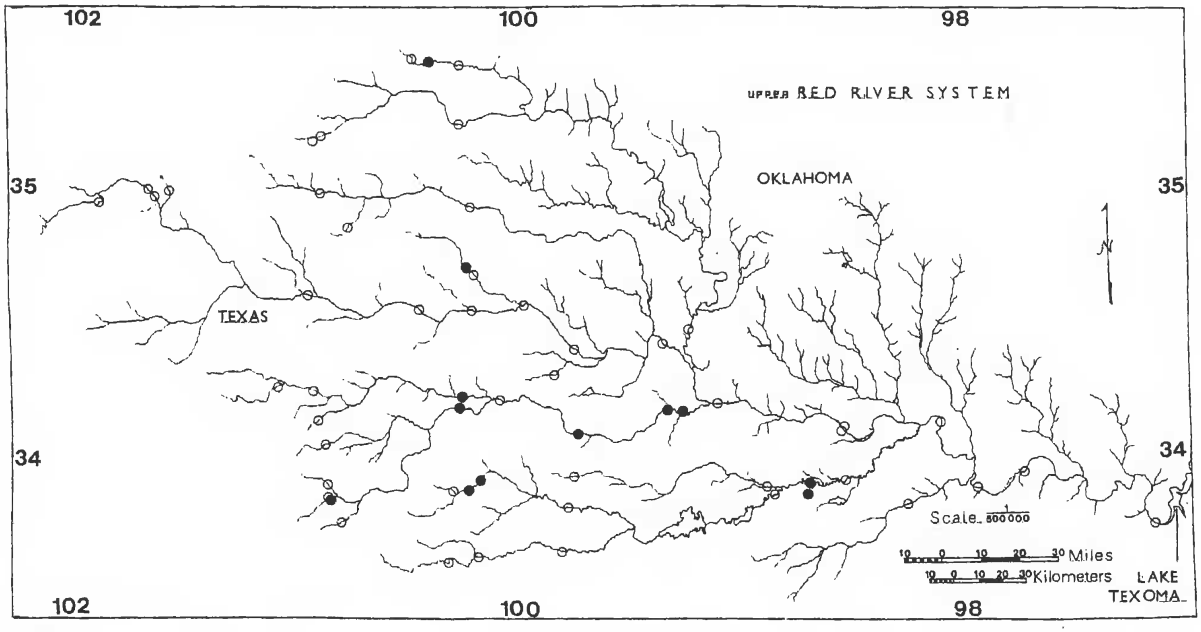
Map 37
Centrarchidae sunfishes
Lepomis macrochirus Rafinesque, 1819
bluegill
15 sites 76 specimens



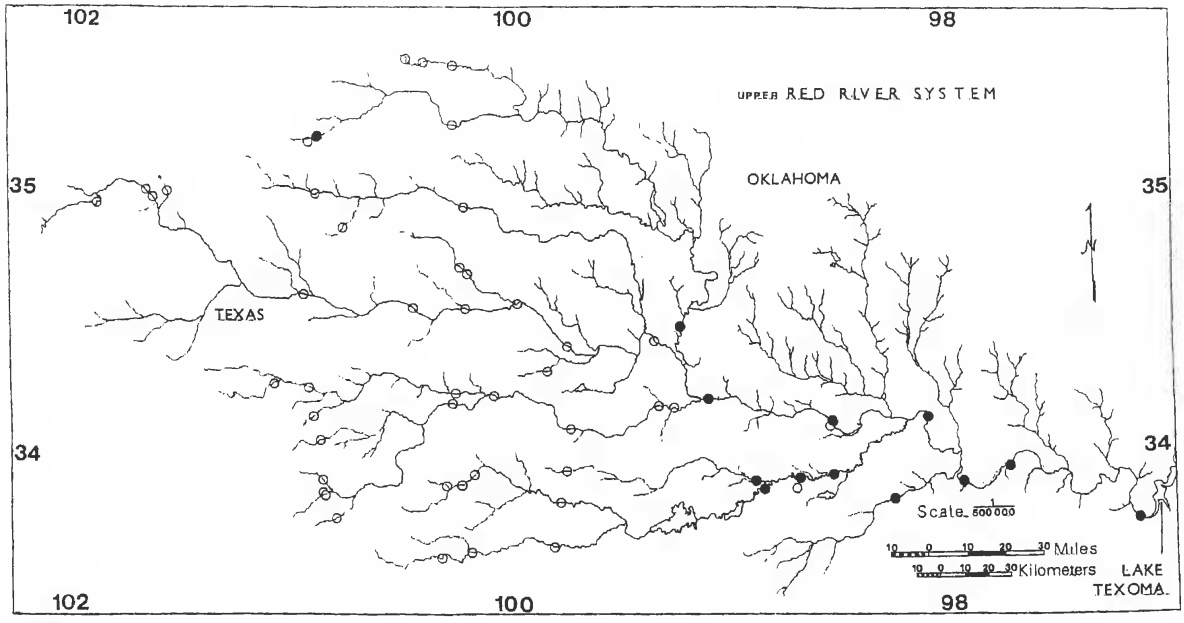
Map 38
Centrarchidae sunfishes
Lepomis megalotis (Rafinesque, 1820)
longear sunfish
24 sites 126 specimens



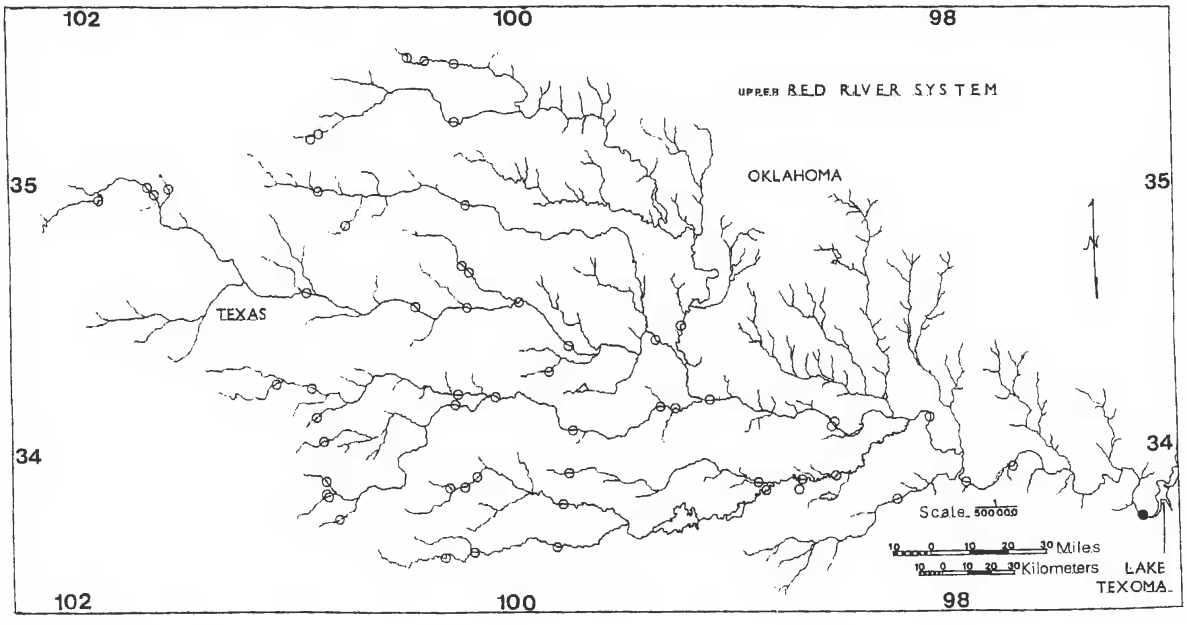
Map 39
Centrarchidae sunfishes
Micropterus punctulatus (Rafinesque, 1819)
spotted bass
1 site 2 specimens



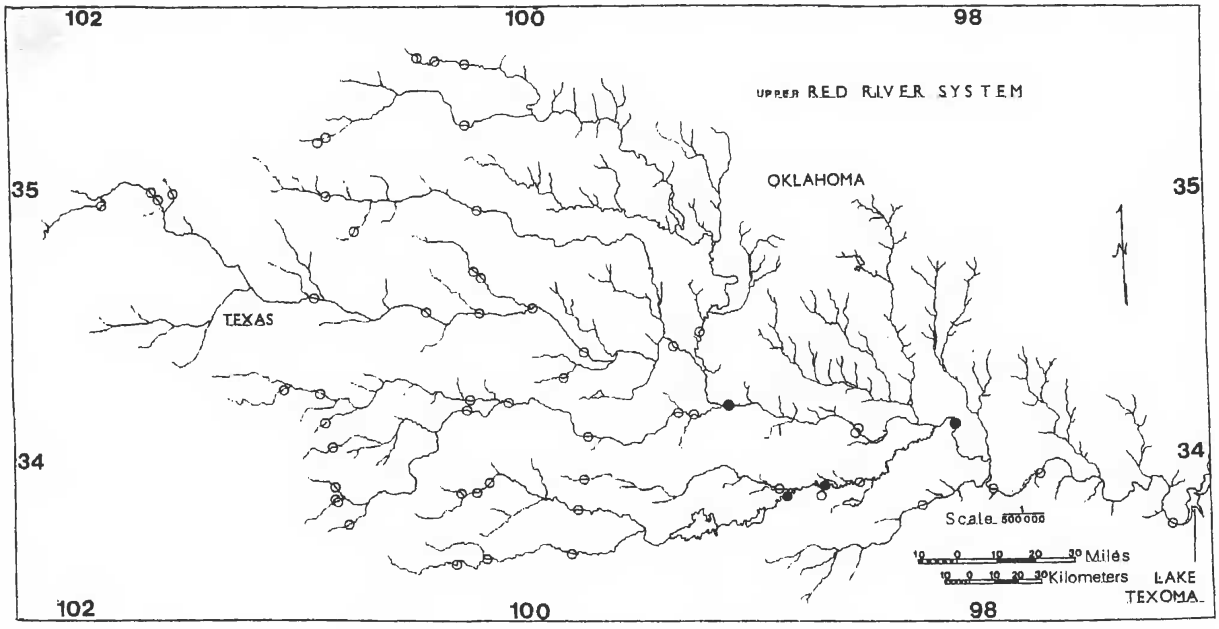
Map 40
Centrarchidae sunfishes
Micropterus salmoides (Lacepède, 1802)
largemouth bass
12 sites 39 specimens



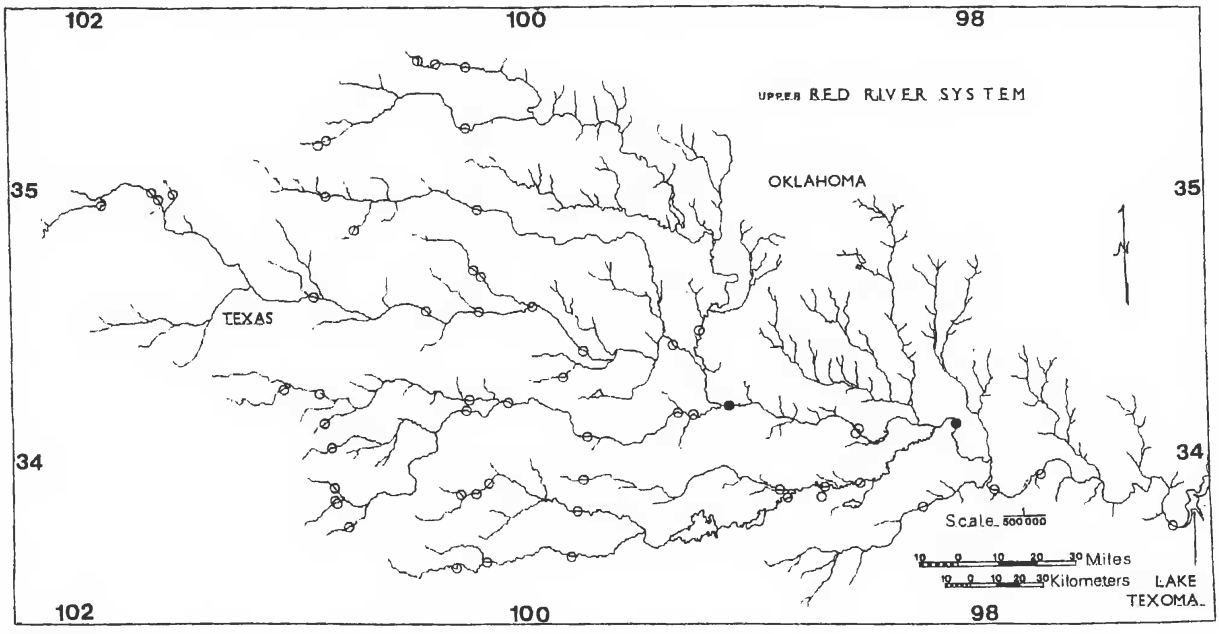
Map 41
Centrarchidae sunfishes
Pomoxis annularis Rafinesque, 1818
white crappie
13 sites 48 specimens



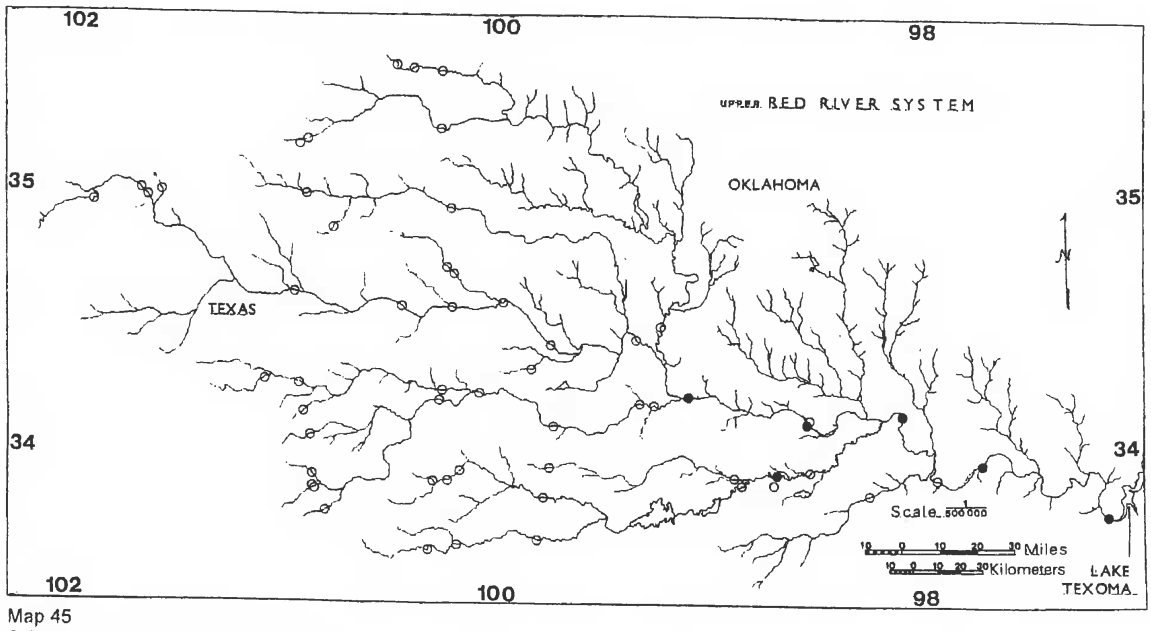
Map 42
Percidae perches
Etheostoma spectabile (Agassiz, 1854)
orangethroat darter
1 site 14 specimens



Map 43
Percidae perches
Percina macrolepida Stevenson, 1971
bigscale logperch
4 sites 7 specimens



Map 44
Percidae perches
Sander vitreus (Mitchill, 1818)
walleye
2 sites 2 specimens



Map 45
Sciaenidae drums & croakers
Aplodinotus grunniens Rafinesque, 1819
freshwater drum
6 sites 24 specimens

The following is a listing of the number of collecting sites, number of fish species and list of species for each of the headwater tributaries and the main stem of the Red River (Figures 1 and 2): **North Fork Red River**, 7 collecting sites, 25 species. Species: *Lepisosteus osseus, Hiodon alosoides, Dorosoma cepedianum, Cyprinella lutrensis, Cyprinus carpio, Hybognathus placitus, Macrhybopsis australis, Notropis atherinoides, Notropis bairdi, Notropis stramineus, Phenacobius mirabilis, Pimephales promelas, Pimephales vigilax, Carpiodes carpio, Ameiurus melas, Ictalurus punctatus, Fundulus zebrinus, Gambusia affinis, Cyprinodon rubrofluviatilis, Lepomis cyanellus, Lepomis humilis, Lepomis macrochirus, Lepomis megalotis, Micropterus salmoides,* and *Pomoxis annularis*. **Salt Fork Red River**, 3 sites, 11 species. Species: *Cyprinella lutrensis, Hybognathus placitus, Macrhybopsis australis, Notropis bairdi, Pimephales promelas, Ameiurus melas, Fundulus zebrinus, Gambusia affinis, Cyprinodon rubrofluviatilis, Lepomis cyanellus,* and *Lepomis megalotis*. **Prairie Dog Town Fork Red River**, 13 sites, 20 species. Species: *Dorosoma cepedianum, Cyprinella lutrensis, Cyprinus carpio, Hybognathus placitus, Macrhybopsis australis, Notropis atherinoides, Notropis bairdi, Phenacobius mirabilis, Pimephales promelas, Pimephales vigilax, Carpiodes carpio, Ameiurus melas, Ictalurus punctatus, Fundulus zebrinus, Gambusia affinis, Cyprinodon rubrofluviatilis, Lepomis cyanellus, Lepomis humilis, Lepomis megalotis,* and *Micropterus salmoides*. **Pease River**, 14 sites, 19 species. Species: *Cyprinella lutrensis, Cyprinus carpio, Hybognathus placitus, Macrhybopsis australis, Notropis bairdi, Phenacobius mirabilis, Pimephales promelas, Pimephales vigilax, Carpiodes carpio, Ameiurus melas, Ictalurus punctatus, Fundulus zebrinus, Gambusia affinis, Cyprinodon rubrofluviatilis, Lepomis cyanellus, Lepomis humilis, Lepomis macrochirus, Lepomis megalotis,* and *Micropterus salmoides*. **Wichita River**, 13 sites, 31 species plus hybrid combination. Species: *Lepisosteus osseus, Dorosoma cepedianum, Cyprinella lutrensis, Cyprinus carpio, Hybognathus placitus, Notropis bairdi, Notropis buchanani, Notropis oxyrhynchus, Notropis potteri, Phenacobius mirabilis, Pimephales promelas, Pimephales vigilax, Carpiodes carpio, Ictiobus bubalus, Ameiurus melas, Ameiurus natalis, Ictalurus punctatus, Menidia audens, Fundulus zebrinus, Gambusia affinis, Cyprinodon rubrofluviatilis, Morone*

chrysops, Morone chrysops x *Morone saxatilis, Morone saxatilis, Lepomis cyanellus, Lepomis humilis, Lepomis macrochirus, Lepomis megalotis, Micropterus salmoides, Pomoxis annularis, Percina macrolepida,* and *Aplodinotus grunniens*. **Little Wichita River**, 1 site, 9 species. Species: *Dorosoma petenense, Notropis buchanani, Ameiurus melas, Gambusia affinis, Lepomis gulosus, Lepomis humilis, Lepomis macrochirus, Lepomis megalotis,* and *Pomoxis annularis*. **Red River** (main stem below confluence of North Fork and Prairie Dog Town Fork), 7 sites, 39 species. Species: *Lepisosteus osseus, Hiodon alosoides, Dorosoma cepedianum, Cyprinella lutrensis, Cyprinella venusta, Cyprinus carpio, Hybognathus placitus, Macrhybopsis australis, Macrhybopsis storeriana, Notemigonus crysoleucas, Notropis atherinoides, Notropis bairdi, Notropis buchanani, Notropis potteri, Notropis stramineus, Phenacobius mirabilis, Pimephales promelas, Pimephales vigilax, Carpiodes carpio, Ictiobus bubalus, Ameiurus melas, Ictalurus furcatus, Ictalurus punctatus, Pylodictis olivaris, Menidia audens, Fundulus zebrinus, Gambusia affinis, Cyprinodon rubrofluviatilis, Morone chrysops, Lepomis cyanellus, Lepomis gulosus, Lepomis humilis, Lepomis macrochirus, Lepomis megalotis, Pomoxis annularis, Etheostoma spectabile, Percina macrolepida, Sander vitreus*, and *Aplodinotus grunniens*.

Winston et al. (1991) presented evidence that the prairie chub, *Macrhybopsis australis*, and the chub shiner, *Notropis potteri*, were extirpated from the upper North Fork Red River due to impoundment by Altus Dam in 1946. They indicated the drastic decline and possible extirpation of the plains minnow, *Hybognathus placitus*, and the Red River shiner, *Notropis bairdi*. Our collections from six sites in the North Fork above Altus Dam were obtained between 1952 and 1987 and in part supported the findings of Winston et al. (1991). We collected *Hybognathus placitus*, *Notropis bairdi* and *Notropis stramineus* at site number 47. *Notropis stramineus* was taken at the three sites along Sweetwater Creek but no *Notropis atherinoides* at any of the six sites above the Altus Dam. The single site below Altus Dam from the North Fork (site number 42) just west of Tipton, Oklahoma resulted in specimens of *Hybognathus placitus, Macrhybopsis australis, Notropis atherinoides*, and *Notropis bairdi* but no *Notropis stramineus*.

Echelle et al. (1972) discussed the relationships of three associated species groups with regards to salinity and other habitat characteristics. They found a positive association between the *Cyprinodon rubrofluviatilis* and *Fundulus zebrinus* complex and the *Hybognathus placitus* and *Notropis bairdi* complex. They also discussed the association with the *Cyprinella lutrensis-Gambusia affinis* complex. We did not determine salinity or any other environmental factors at our collecting sites and thus we will not attempt any direct comparisons. However, we will present data with regards to relationships within species pairs based on material from 58 collecting sites in the upper Red River system.

Neither *Cyprinodon rubrofluviatilis* or *Fundulus zebrinus* were in 15 of the 58 collecting sites (26%). Both species were in 31 (72%) of the remaining 43 sites. *Fundulus zebrinus* was in 9 (21%) of the 43 sites and *Cyprinodon rubrofluviatilis* was alone in 3 (7%) of the 43 sites.

Neither *Hybognathus placitus* or *Notropis bairdi* were in 21 of the 58 collection sites. Both species were in 28 (76%) of the remaining 37 sites; *Hybognathus placitus* was in 5 (13%) of 37 sites and *Notropis bairdi* was in 4 (11%) of 37 sites.

In the *Cyprinella lutrensis-Gambusia affinis* complex, neither species was in eight of the 58 sites. Both species were in 34 (68%) of the 50 sites; *Notropis lutrensis* was in 13 (26%) of the 50 sites; and *Gambusia affinis* was in 3 (6%) of the 50 sites, thus the three species pairs demonstrate a high degree of association.

The desalination project in the upper South Fork of the Wichita River was initiated with an inflatable collection dam (Bateman dam) and became operational in 1987 (Echelle et al. 1995). Echelle et al. (1995) presented data on fishes in 16 collections, taken in 1994 from the Wichita River system upstream of Kemp Lake. In addition to the twelve species in common with our study they reported *Dorosoma cepedianum, Carpiodes carpio, Notropis buchanani, Phenacobius mirabilis*, and *Macrhybopsis australis*. This study included two additional species, *Lepomis megalotis* and *Micropterus salmoides*, from above Kemp Lake. Our collections from the Wichita River system, above and

below Kemp Lake resulted in 31 species plus the hybrid combination, *Morone chrysops* x *Morone saxatilis*.

Buchanan et al. (2003) reported 72 species in the main stem of the Red River in Arkansas as a result of their efforts during 1995-2001. Eleven fish species historically known from the Red River in Arkansas but not taken during 1995-2001 brought the total to 83 species.

Obviously the upper Red River system is depauperate in fish species richness with only 45 species in 84 collections from 58 sites. Buchanan et al. (2003) stated that the Red River exhibits the pattern of increasing fish species richness from headwaters to downstream.

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APPENDIX

Checklist of fishes collected in the upper Red River system, with map numbers, number of sites, and specimens collected per species.

Family, Scientific, and Common Names	Map Number	Sites Collected	Specimens Collected
Lepisosteidae - gars			
Lepisosteus osseus (Linnaeus 1758) longnose gar	1	8	19
Hiodontidae - mooneyes			
Hiodon alosoides (Rafinesque 1819) goldeye	2	2	2
Clupeidae - herrings			
Dorosoma cepedianum (Lesueur 1818) gizzard shad	3	12	1,177
Cyprinidae - minnows			
Cyprinella lutrensis (Baird & Girard 1853) red shiner	4	47	15,021
Cyprinella venusta Girard 1856 blacktail shiner	5	1	5
Cyprinus carpio Linnaeus 1758 common carp	6	9	46
Hybognathus placitus Girard 1856 plains minnow	7	33	31,907
Macrhybopsis australis Hubbs & Ortenburger 1929 prairie chub	8	18	3,121
Macrhybopsis storeriana (Kirtland 1845) silver chub	9	3	26
Notemigonus crysoleucas (Mitchill 1814) golden shiner	10	1	1
Notropis atherinoides Rafinesque 1818 emerald shiner	11	9	2,483
Notropis bairdi Hubbs & Ortenburger 1929 Red River shiner	12	32	17,022
Notropis buchanani Meek 1896 ghost shiner	13	7	260
Notropis oxyrhynchus Hubbs & Bonham 1951 sharpnose shiner	14	1	8
Notropis potteri Hubbs & Bonham 1951 chub shiner	15	8	1,220

Appendix I. (cont.)

Family, Scientific, and Common Names	Map Number	Sites Collected	Specimens Collected
Cyprinidae - minnows			
Notropis stramineus (Cope 1865) sand shiner	16	6	127
Phenacobius mirabilis (Girard 1856) suckermouth minnow	17	9	60
Pimephales promelas Rafinesque 1820 fathead minnow	18	30	990
Pimephales vigilax (Baird & Girard 1853) bullhead minnow	19	19	821
Catostomidae - suckers			
Carpiodes carpio (Rafinesque 1820) river carpsucker	20	11	1,814
Ictiobus bubalus (Rafinesque 1818) smallmouth buffalo	21	3	25
Ictaluridae - North American catfishes			
Ameiurus melas (Rafinesque 1820) black bullhead	22	16	53
Ictaluridae - North American catfishes			
Ameiurus natalis (Lesueur 1819) yellow bullhead	23	1	1
Ictalurus furcatus (Lesueur 1840) blue catfish	24	1	25
Ictalurus punctatus (Rafinesque 1818) channel catfish	25	14	306
Pylodictis olivaris (Rafinesque 1818) flathead catfish	26	3	10
Atherinopsidae - New World silversides			
Menidia audens Hay 1882 Mississippi silverside	27	7	809
Fundulidae - topminnows			
Fundulus zebrinus Jordan & Gilbert 1883 plains killifish	28	41	7,101
Poeciliidae - livebearers			
Gambusia affinis (Baird & Girard 1853) western mosquitofish	29	37	1,381
Cyprinodontidae - pupfishes			
Cyprinodon rubrofluviatilis Fowler 1916 Red River pupfish	30	34	11,530
Moronidae - temperate basses			
Morone chrysops (Rafinesque 1820) white bass	31	6	33
Morone chrysops x M. saxatilis palmetto bass	32	1	1
Morone saxatilis (Walbaum 1792) striped bass	33	1	2
Centrarchidae - sunfishes			
Lepomis cyanellus Rafinesque 1819 green sunfish	34	35	278
Lepomis gulosus (Cuvier 1829) warmouth	35	3	3
Lepomis humilis (Girard 1858) orangespotted sunfish	36	19	184

Appendix I. (cont.)

Family, Scientific, and Common Names	Map Number	Sites Collected	Specimens Collected
Centrarchidae - sunfishes			
Lepomis macrochirus Rafinesque 1819 bluegill	37	15	76
Lepomis megalotis (Rafinesque 1820) longear sunfish	38	24	126
Micropterus punctulatus (Rafinesque 1819) spotted bass	39	1	2
Micropterus salmoides (Lacepéde 1802) largemouth bass	40	12	39
Pomoxis annularis Rafinesque 1818 white crappie	41	13	48
Percidae - perches			
Etheostoma spectabile (Agassiz 1854) orangethroat darter	42	1	14
Percina macrolepida Stevenson 1971 bigscale logperch	43	4	7
Sander vitreus (Mitchill 1818) walleye	44	2	2
Sciaenidae - drums and croakers			
Aplodinotus grunniens Rafinesque 1819 freshwater drum	45	6	24

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